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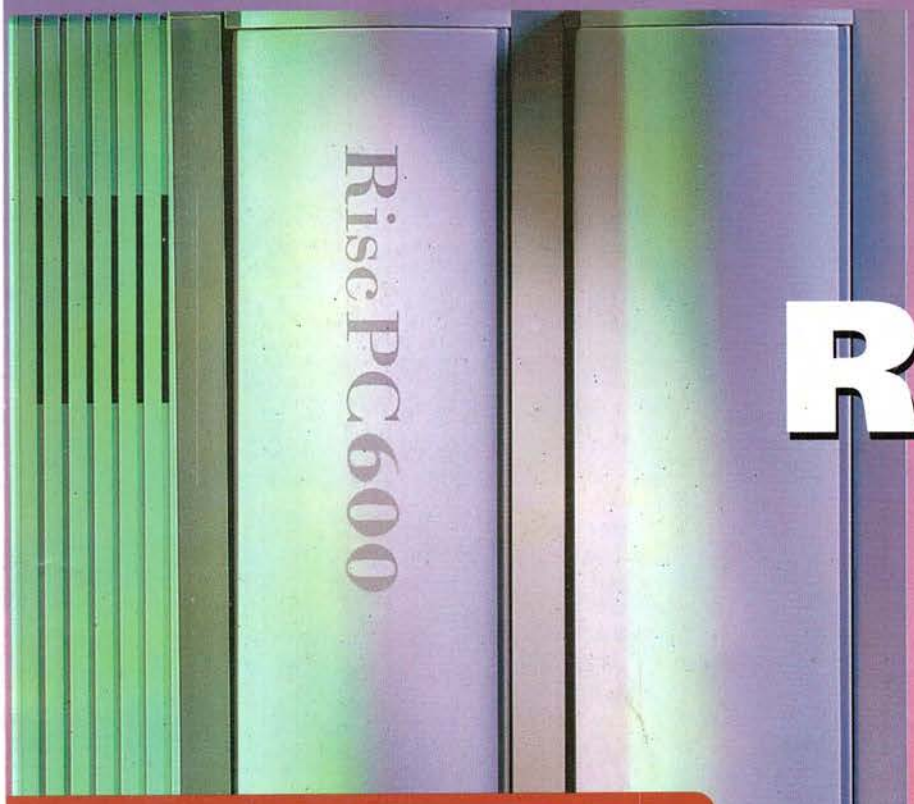
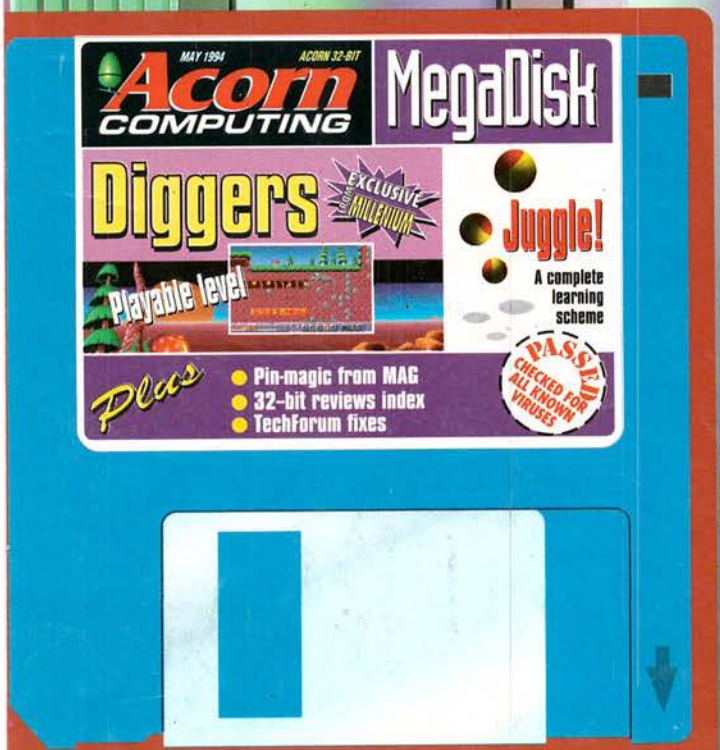


RISC PC

Risc PC

Acorn's latest project unveiled



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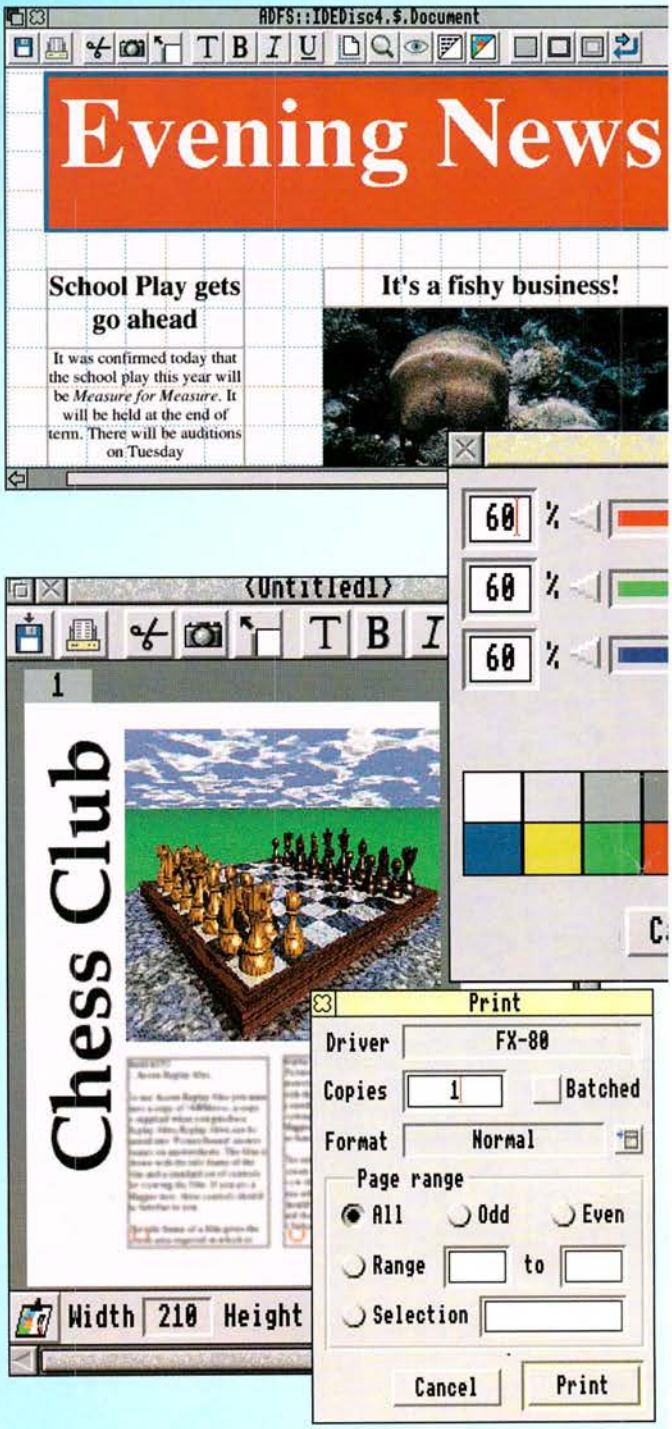

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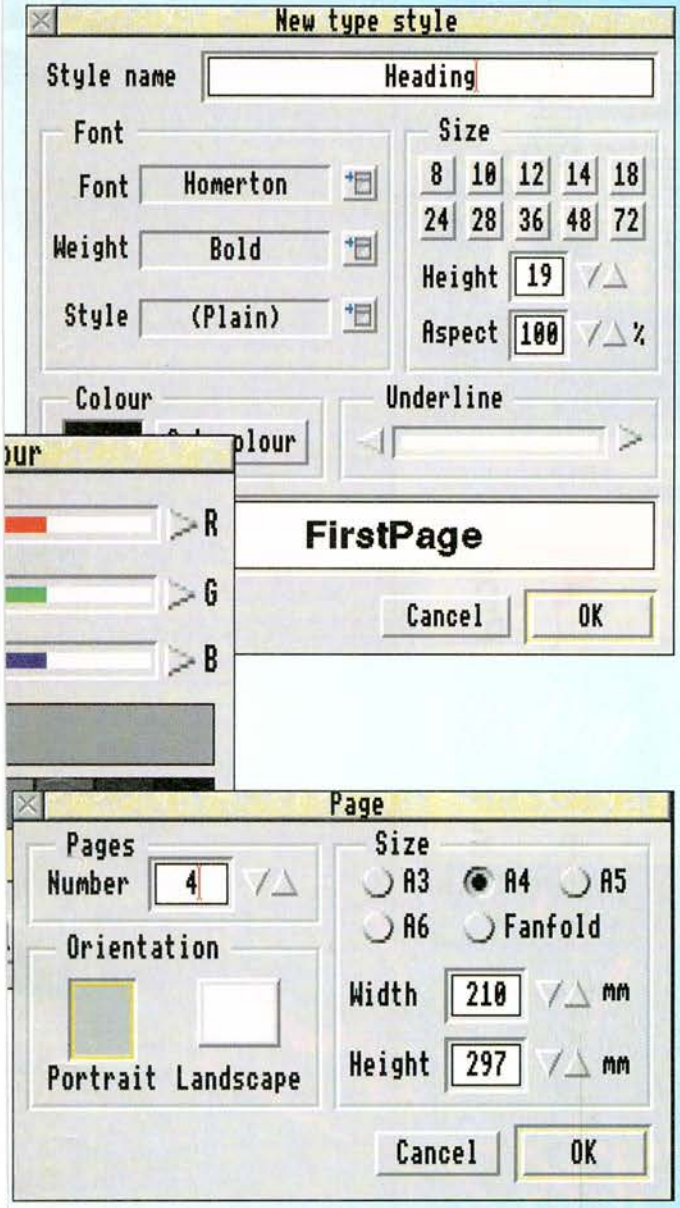

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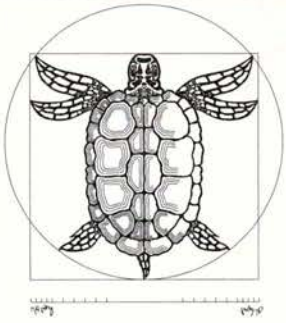

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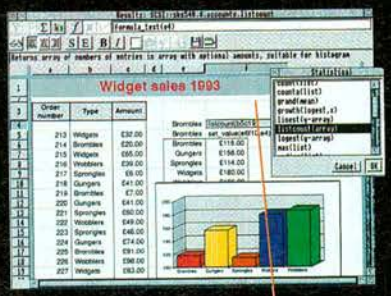

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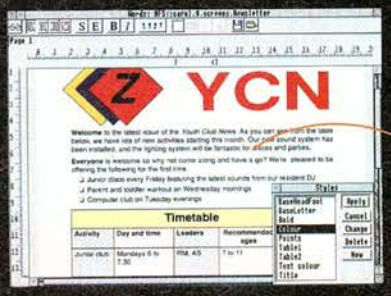

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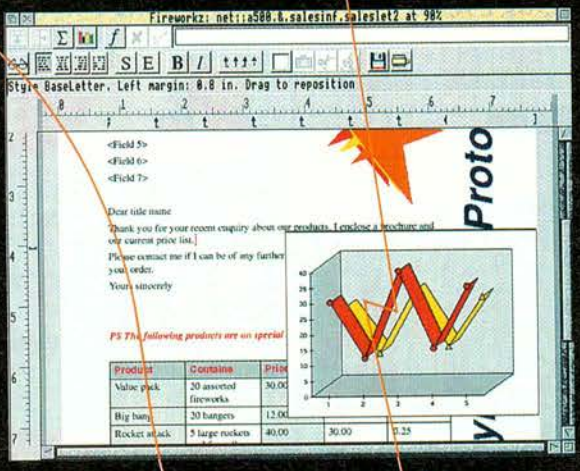

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June issue on sale 26th May

Acorn's Risc PC

FIND out all about this incredible new machine from Acorn in our massive 10-page feature starting on Page 21. Plus you can see what the main Acorn developers think of the new system in Newsbeat.

REGULARS

Comment 11
Proof at last – using a PC wastes money. Steve Turnbull explains all, and gives his opinions on the new Risc PC.

News 13
All the latest news of products and events taking place in the fast changing world of the Acorn computer.

TechForum 55
Are you an expert programmer? Our hints and tips series is just for you with ideas and algorithms to help you work.

Public Domain 57
Teri Paul is back again with her pick of public domain and shareware programs to enhance your computer.

Mad Hatter 68
Our adventure game wizard guides you through the closing stages of Fish! and continues his look at the Pawn.

Body Building 74
Build your own behavioural lab with the help of Mike Cook and your very own Acorn computer.

Problem Solved 85
Our technical editor opens his mail and shares the secrets behind some of those tricky hardware problems.

Letters 88
This is your opportunity to voice your news, ideas and views on everything in the Acorn world, from viruses to joysticks.

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Check out what's in store for you this month on the best cover disk available for the Acorn 32-bit RISC OS range.

32-bit Subscribers 7
Our special extra subscriber's disk is jam packed full of goodies so find out what's on it this month.

BBC Disk 8
Full details on what's on the subscription disk for the 8-bit BBC Micro this month, and how to use it.

The Risc PC 21
We take an in-depth look at Acorn's new flagship and explain how it affects Acorn's position in the market place.

Graphics 40
Mike Goldberg does some exciting things with pins and animated faces using his pin-magic simulation.

About disks 47
Discover all about how your 3.5in disks are produced, in this fascinating article.

PhotoCD 49
We update our theory of PhotoCD with a look at the practical software now available for Acorn machines.

Juggling 61
Now you can learn how to juggle with the help of Mike Cook and son in this radical teaching system.

ESP Soundcard 71
With 8-channel stereo sound, do Acorn machines need a sound card? Judge for yourself with a look at this impressive hardware.

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Learning Curve 33
We survey the latest in educational software for the Acorn computers:
- 10/10 Junior Essentials
- 10/10 French
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Rhythm-Maker 43
Creating music is one thing but with Rhythm-Maker you can produce amazing beat patterns, we check it out.

PDSview 45
We take a look at the latest incarnation of the *Planetary Data System* viewing software and go for a walk in space.

Screenplay 65
All systems go as we look at the latest for 32-bit Acorn machines:
- Premier Manager
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- Anti-grav

THE MEGADISK

Britain's best Acorn cover disk contains hours of fun and a host of useful utilities linked to our editorial features to make the magazine come alive on your desktop.

Full details about the packed Megadisk – see Page 6.

- **Diggers** Try out this fun game
- **Juggling** Now you can really learn to juggle
- **TechForum** More fixes for your software

Subscribe now! – See page 44

SUBSCRIBE to *Acorn Computing* and you'll get an amazing value-for-money deal that beats all our rivals: Not only do you get a whole years-worth of issues for LESS than any other Acorn magazine, 32-bit owners get TWO disks every month.

See Page 44 for details of this unbelievable offer.

If you have a BBC Micro, *Acorn Computing* is the only magazine that still supports you. Every month we have complete programs written specially for you and your computer.

To subscribe turn to Page 44 now.

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Most of the editorial and adverts in this magazine were produced with ArtWorks and Impression by Computer Concepts

The MegaDisk

What's on this month

- Diggers
- Juggle
- Pin-magic
- Program from the magazine

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If there seems to be a fault with one of the programs please contact us by post describing your machine set- up and exactly what happens when you run the program.

Diggers : Mining extravaganza

THIS new game from Millennium (0223 844894) was reviewed in the April issue of *Acorn Computing* and this very special demo contains one of the first simple levels of the full game. It will let you experiment with equipment from the shop and have fun attacking the computer player with your mining prowess.

Here's a few useful hints: Use dynamite to start floods or damage the computer's equipment; the pink jewels (Jennite) which are lying around cannot be mined, but they are very valuable and worth the risk.

One aspect that the demo doesn't go into is the overall idea of making money – later levels need more and more money to invest in equipment or just to survive. Is your commercial acumen up to the cut and thrust?

The full game contains 34 cunningly designed levels, four races of diggers each with their own characteristics, six different graphical lands, more music and full intro and outro sequences. It contains over 4Mb of data and may be installed on a hard disk or run from floppy.

Owners of SVGA, VGA and some multisync monitors may find that the normal mode that diggers runs in will not display correctly on their monitor. If this is the case, load Diggers' !Run file into !Edit and change the line that says:

```
RMEnsure DiggersMode 0.00 RMRUN <Di
ggers$Dir>.50KHzMode
```

to:

```
RMEnsure DiggersMode 0.00 RMRUN <Di
ggers$Dir>.100KHzMode.
```

Good luck, and may all your rocks be rich ones!

● *There's more than one place to start burrowing*

● *Death is an expensive business – avoid it*

● *You can always return to base to avoid trouble...*

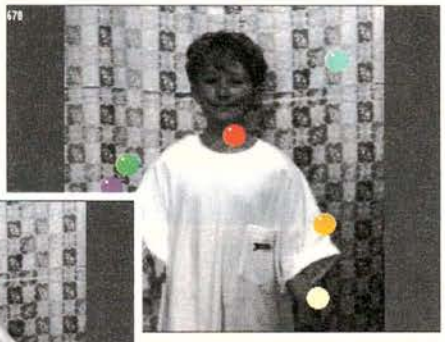
● *...after all, you're not alone down there*

Juggle: Learn the tricks of the trade

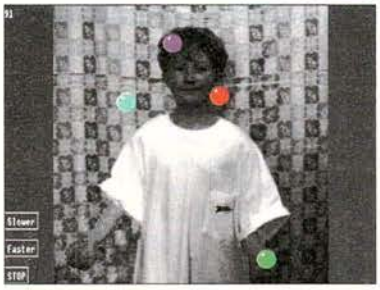
Have you tried to juggle and given up in frustration? Most professionals say that they can teach you the basics in half an hour, but the key is practice – and then even more practice.

Now your computer has infinite patience, and in this short program we'll not only teach you the basics, but also some impressive juggles to stun your friends. We've also included some *impossible* ones which only your computer can perform.

To find out more about this program and juggling notation, take a look at the article on page 61. Also you can order your own set of *Acorn Computing* juggling balls.



●*You really need anti-gravity to make this work*



●*Okay Alec – do your stuff*

What's on this month

- **8-bit programs – April and May**
- **Public Domain software**

Getting started with the MegaDisk

THE programs on this disk are stored in a highly compressed format which sometimes enables as much as 1.6Mb of programs and data to be stored on a 800k floppy disk

The procedure for running the programs is very straightforward and does not require learning any special methods or techniques.

Switch on your Acorn micro, put the disk in the drive and click the drive icon. Now double-click !ACmenu – there's a short pause while it scans the archive then it displays a window of the contents. You can treat this new window like any other one for viewing disk contents, and run programs and open directories by double-clicking them.

Large programs must be unpacked by dragging them on to a separate disk before being run. Some may have an !Install program that will do it for you.

We recommend that you always read the !ReadMe files or access the help information via the Help button.

32-BIT Subscriber's disk

PD: A musical choice

Teri Paul has put together a selection of programs this month, with music and leisure in mind. To find out more about them read the PD Column on page 57.

- DrawGrab – a utility to add to your DTP library
- KingOut – one for fans of sliding block puzzles
- RiscTimer – useful for people working from home
- Sevens – challenge your computer to a game of cards
- TempGrab – another useful utility for your collection
- WimpZarch – bring the classic David Braben game to your desktop
- APTrack – compose, sample and create sounds
- Clown – play your Coconizer tunes with style
- Effex – a sample editor with ...
- Harmonica – create samples by changing the harmonics

●*Playing sevens*

8-bit access: Leisure control

The Lemmings-like Colony, which didn't make it on to the 32-bit disk last month due to space restrictions, is included this month. Unfortunately, you cannot access this via the !65Host, but if you have a BBC B or Master and a serial link you can play this excellent adaptation.

You can read full details of what's on the May disk on the following page, but to summarise here is what you can dig into either via the !65Host or a serial link:

- Trio – Colour Tetris
- HeliChopper – horizontal scrolling shoot-'em-up
- Fast Mandelbrot generator
- Fancy text procedure

●*Can you get the King out*

Next month

We have a selection of education and games for you to explore, a host of useful programs to enhance your computer, and all the coded programming ideas used in the magazine.

Full power 8-bits

Acorn COMPUTING

Don't miss out on the great programs for the Acorn 8-bit machines that you can receive every month. From software written specially for *Acorn Computing* readers to an excellent selection of PD programs.

Subscribe now, turn to Page 44

Trio: Colour Tetris

ON the Acorn 32-bit machines there are now several versions of a game called Colour Tetris, but until now BBC Micro owners have not had one. To make up for this here's a very nice version that even has a two player option.

Like all the best games the idea is very simple, a vertical set of three different coloured blocks descends into a well. As it drops you can alter the order of the colours and move the set from left to right.

When the set comes to rest the computer checks to see if a horizontal, vertical or diagonal line of three or more of the same colour has been created. If it has, the blocks in the line are removed and any unsupported blocks drop down.

As they come to rest the check is again made to see if lines have been created and so on. When the blocks at the bottom stop disappearing the next set start to drop.

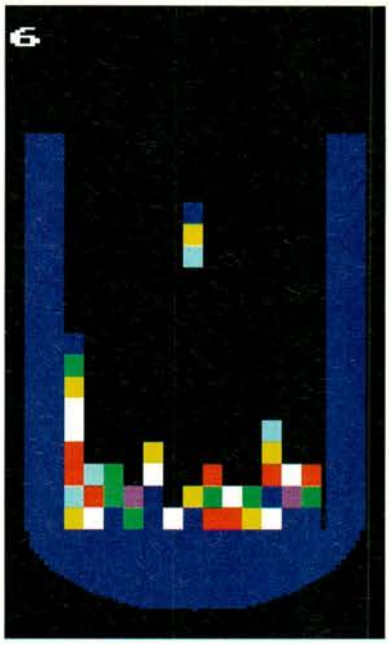
And that's all there is to it. Except for the fact that if you don't create lines the well begins to fill up and you have less time to work out the best position to place the new set of colours and in what order they should land.

The keys are as follows:

	Player 1	Player 2
Left	X	,
Right	Z	.
Rotate	F	:
Down	C	/

A useful hint, developed from hours of playing, is that it's best to create horizontal and diagonal lines rather than vertical ones, because the more piles of blocks you can affect with each set, the better.

Michael Elson



Shadow: The 8-bit version

In the April 1993 issue of Acorn Computing, there was a program listed on the pages for the 32-bit disk called *Shadow Text*. But why should the 32-bit machines have all of the fun, so here's an 8-bit version. Called *ShdTxt8*, it has the same procedures as those which were listed in the magazine for the 32-Bit version.

If you missed the April 1993 issue, the *Shadow* procedure required several parameters to be passed, which were:

- The X and Y printing co-ordinates
- Foreground colour
- Colour of shadow
- Shadow style code
- String of text to be displayed

For this version, however, the X and Y co-ordinates must be given as for graphics operations, i.e. such as when you issue the *MOVE x,y* command. My version of Shadow Text must be run in a mode with four or more colours – modes 1, 2 or 5 – on the BBC Micro. The shadow effect is generated from the same six commands, which are:

- Change to shadow colour
- Move to shadow position
- Print the text
- Change to foreground colour
- Move to the absolute position
- Re-print the text

Eight different styles of shadow are available, with the relevant code being passed to the procedure in its fifth parameter:

Code	Shadow position
1	Top-left corner
2	Above
3	Top-right corner
4	Left
5	Right
6	Bottom-left corner
7	Below
8	Bottom-right corner

The outline routine develops this idea further by including a call to all of the effects in a single procedure. The parameters for the outline procedure are the same as above, with the exclusion of the style code.

Any of your programs which run in a screen mode offering four or more colours, except for those which run in Mode 7, could benefit from these routines, becoming brighter and more pleasing to the eye.

Dave Bradforth

Ultibrot: Teaching old dogs better tricks

FEW people in the computing industry can claim to have missed the mandelbrot. Almost every computer built soon gains numerous versions – it is often considered as a benchmark, with people comparing times for plots.

This is a little suspect since a screen full on a high-end workstation may well be about 4Mb of information whereas an 8-bit micro will probably be doing no more than 16K. The irony is that the workstation is still almost guaranteed to finish first.

This program is my version of the classic mandelbrot problem and is able to produce the complete set – the simplest plot – in under three minutes on a model B, and quicker with a second processor.

The system is run by typing *RUN ULTBROT. First, it generates the complete set, after which, it shows the information panel on the right of the screen. This process takes from about one and half to three minutes, depending on computing power available.

The panel on the right shows the various statistics and options. The top set of three figures describe the display dimensions, and the next three, the selected area dimensions.

Next, are two figures labelled *Stp* and *Sze*. The first is the maximum number of iterations to try on a pixel's value before giving up, and the other, the number of points to include in the plot, for example, 128 means 128 x 128 points.

The available keys are shown in the adjoining figure. The save option, S, uses *SAVE and so will not work with shadow ram enabled, but will work with a second processor.

The mandelbrot problem itself involves iterating the function, z=z^2+c, where all values are complex, and c's value is the initial value of z. For any starting point, it behaves in one of three ways. Either, z will head to infinity – the points outside the set, it will head to zero – the points inside the set, or it will loop, never reaching either – the points on the boundary.

Most computers find the concept of infinity a little difficult to comprehend, so the problem needs to be redefined in concrete terms. It turns out, in this case, that once the value of z is greater than a distance of two units from the origin it will definitely go to infinity, and, hence, not be in the set.

As most programming languages don't have complex value handling, all this is converted to the form that can be seen in most of the mandelbrot programs (see listing).

Three ideas are used to get more speed. There are no loops in the multiplication, different arithmetic precisions, and a recursive technique for spotting large areas of colour.

The first is fairly common on uncached processors, and involves repeating the same piece of code lots of times instead of having it once and using a loop. This gets rid of overheads involved with providing loop counters, and so on, but does make the program larger.

The second uses three point generators which are selected automatically depending on the magnification. One is for 24-bit, one for 32-bit and one for 40-bit calculations. This may seem silly as the lower precision routines are as likely to produce errors whatever is being plotted.

It is, however, more noticeable at higher magnifications as they tend to occur on the boundaries between colours and these are the areas that are usually examined.

The third optimisation avoids calculating large areas of the same colour by drawing squares. If the perimeter is all the same then the whole square will be that colour too. If not, it divides it up into four smaller boxes and tries each in turn.

Andrew Bennett

Listing

```
DEF FNmand_val(x,y,maxsteps)
LOCAL a,b,c,d,iter
a = x
b = y
iter = 0
REPEAT
c = a*a
d = b*b
b = 2*x*y+y
a = u-v+x
iter = iter+1
UNTIL c+d>4 OR iter=maxsteps
=iter
```

Cursor keys	Move selection box
<, >	Resize selection box
Shift	Speed up movement
Return	Start plot
f0, f1	Change the number of iterations
f2, f3	Change plot size
S	*SAVE picture
B	Redraw the complete set
Q	Quit

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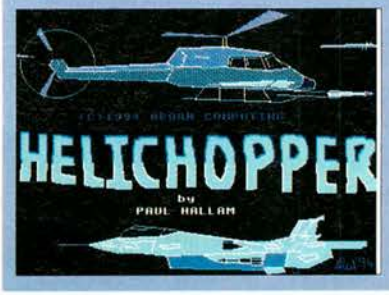
Hungerford
Berkshire RG17 0L7

If there seems to be a fault with one of the programs please contact us at the magazine by post describing your machine set-up and exactly what happens when you run the problem program.

Helichopper: Odds on the enemy

The enemy is waiting with irresistible force and all that can be mobilised against them is a handful of craft piloted by foolish and desperate people – usually called heroes – who thrive under such impossible odds.

In fact these particular heroes would much rather be somewhere else, after all the powers-that-are have insisted in sending them in against jet fighters using nothing but helicopters.



The stage is set and you control the helicopters as they fly against the enemy aircraft. Between shooting down those highly manoeuvrable jets you also have to deal with the large missiles they'll fire at you.

Not only that but airspace is not empty, there are flocks of geese to avoid and the mad balloonist who seems heedless of the warfare going on around him. You can shoot him down but he'll soon be up and about again.

There's a design fault in the missile system which means that if a second missile is launched before the first one has either hit a target or gone out of range, the first one is destroyed. However this bug can be used as a feature because you can launch the next missile if you know the current one has missed.

Happy battling. **Paul Hallam**

ICS WIZZO (it's magic)

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The ideA range

ICS was the first company to offer IDE products for Acorns back in 1990; now they are the standard choice for new Acorn computers. Building on three years' experience we have continually improved our IDE filing system. It now offers the highest level of RISC OS compliance, and compatibility with at least 62 different hard discs tested by us. Can any other supplier make this claim?

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Our hard disc upgrade kits are based around two internal interfaces at present: A3IN for the A3000 Series, and ARCIN for the A300/A400/A500 Series. All kits are designed to a high standard and include all the parts you will need.

A3IN upgrade kits include an I²C expansion socket as standard. They come with a 2½" disc already attached, and are easy to fit once you have opened up your computer. You may safely take no notice of rumours still being spread that internal upgrades might not be safe in an A3000. We have adhered carefully to the guidelines in Acorn's technical specifications, and in three years have never come across a problem.

ARCIN upgrade kits provide a fast 16-bit link all the way from the computer to the hard disc. They can even be fitted to an A310 without a backplane – quite a cost saving. A second hard disc can easily be added later if required.

Interfaces and hard discs can also be bought separately. By shopping around you may even save a few pounds. But beware: not all IDE hard discs work with all interfaces, and if you have a problem it may be difficult to decide who should put it right. We recommend buying a complete kit from one source.

WIZZO is the name given to our IDE filing system when it is supplied as a single rom chip. Wizzo5 is for the A5000, and Wizzo4 is for the A4. You should buy a Wizzo if you need password protection or wish to use larger hard discs. (Wizzo4 has been delayed slightly – we are adding a feature to ensure compatibility with possible future A4 upgrades).

A Wizzo rom by itself will only produce a slight speed improvement. If you need speed in an A5000, fit an ARCIN interface instead. Up to 60% improvement can then be achieved, but this does depend which hard disc you use so do check with us first.

How to read our ideA product references

A number at the end is the nominal hard disc capacity in megabytes. We usually round this down, so the actual formatted capacity may be higher. All discs have auto-parking. Average access times vary but all are below 20 ms.

All prices shown exclude VAT and are subject to change without notice. The cost to us for hard discs can vary enormously from week to week – not always downwards! Your local dealer can obtain *ideA* products from us or from a distributor.

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Package includes formatted hard disc, ideA interface card, hard disc cradle and fittings, fan kit, replacement multi-purpose LED (power and drive status), manual with fitting instructions. Can be fitted to an A310 without a backplane. If a backplane is used it must be a 4-layer type. Easily fitted by most users.

ARCIN 200	£270	ARCIN 420	£450
ARCIN 240	£290	ARCIN 540	£550
ARCIN 330	£359	ARCIN 1000	£875

A3000 Series Fully Internal Upgrades

Package includes formatted hard disc mounted on ideA interface card, manual with fitting instructions. Fully internal, using internal expansion slot. Co-exists with floppy drive and memory upgrades. Fits the new 1992 computers. Easily fitted subject to Acorn warranty stipulations.

A3IN 60	£190	A3IN 120	£275
A3IN 80	£225	A3IN 130	£315
A3IN 240	£399		
A3000 FAN KIT (not usually required*)	POA		

**Only required if the computer has been fully upgraded, e.g. with maximum memory AND Econet AND an external podule.*

Separates for hard disc upgrades

We can only guarantee the performance of ideA interface cards with hard discs we have tested ourselves, so please check if in doubt. If you are buying a hard disc for an A5000 please say so. If you intend to fit the disc in addition to an existing one we need to know the make and model of the existing disc. Acorn's interface does not support all makes of disc, and some models will work as a second disc but not on their own.

Hard discs on their own are listed as, for example, HD80. An S at the end indicates a 2½" disc.

ARCIN (Archimedes Interface for Internal disc(s))	£60
A3IN (A3000 Interface for Internal disc)	£75
ARCHIMEDES INTERNAL CRADLE KIT	£15
ARCHIMEDES A300 / A400 SERIES FAN KIT	£15
4-SLOT 4-LAYER BACKPLANE	£52
POWER CABLE FOR SECOND HARD DISC	£5
A5000 SECOND HARD DISC FITTING KIT	£15

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HD240	£240	HD540	£500
HD330	£309	HD1000	£825
HD60S	£130	HD120S	£215
HD80S	£165	HD130S	£255
HD240S	£339		

WIZZO IDE Filing System on rom

Package includes rom, manual and fitting instructions. Compatible with RISC OS 3.0 and 3.1. Allows up to four logical partitions over two physical drives. Each partition appears separately on the icon bar and can have different password protection. Makes use of existing Acorn hardware for maximum compatibility, but works with a wider range of hard discs. Security breaches using ADFS can be prevented. Can be fitted easily by a competent user.

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Best of three worlds

Steve Turnbull looks at two connected issues

THIS Comment should probably be labelled *Comments* as a couple of things cropped up this month which I'd like to look at.

First up is my vicious and heartless vendetta against PCs. I have been criticised for blandly stating that Windows is not intuitive and absorbs so much of the power of the PC, that an A5000 chugging along comfortably at 33MHz is equivalent to a 66MHz 486 DX/2 PC that's straining at the seams like a demented steam train.

Where's my proof? Well, up until last week I didn't have any – apart from personal (admittedly biased) experience. The proof takes the form of analysis that I've been saying is the only way of comparing machines – by measuring the time taken to perform similar tasks on the different platforms.Well it's been done though only two types of computer were compared, the PC and the Mac.

The study took a group of 100 business users and measured their productivity across 24 different tasks, like editing documents, managing files, printing and so on. The results were measured in two areas: Time taken to complete the task and whether or not it was done right.

Cutting the results to the bone: Handling files took 68 per cent less time on the Mac, document editing took 33 per cent less time and printing took 57 per cent less time. As far as correctness, 85 per cent of the Mac users got their tasks right compared with 58 per cent of the PC users.

This shows that PCs are not good for productivity and even if the results are heavily biased, which is not entirely unlikely, the difference is *so* significant it cannot be ignored.

I have to return to personal experience at this point: File handling is faster on RISC OS than a Mac, software on RISC OS machines is much more responsive so document editing is probably faster – at worst it's the same – and for printing, well personal experience fails me at this point. But at least with Acorn you're not forced to buy own-brand printers.

Time is money and it's about time people woke up to the money that's being wasted by using PCs. 'Nuff said.

The Risc PC is on the cover and it's all over the inside of the magazine, in fact if it wasn't for the release of Apple's PowerMac it would probably be all over the rest of the computer press as well.

So we're making a big fuss about the Risc PC but is it worth it? After all, the user interface is pretty much the same as the A5000's and that's the most important thing, isn't it?

Well, normally it is. But here we have a radical change to the hardware which is barely noticeable on the surface, in fact the lack of difference in the user interface is crucially important to the success of the machine.

RISC OS 3 is very very good, it's easy to use and doesn't interfere with the work you're doing – although I'd prefer save boxes to stay on screen when I've forgotten to open the right directory, then again I usually only have to press F3 to get it back.

Perhaps the most important thing that the Risc PC signifies is the change in Acorn's product development policy. It was the BBC A3000 that really typified what can only be described as the *insanity* of Acorn's previous development policy. It worked something like this:

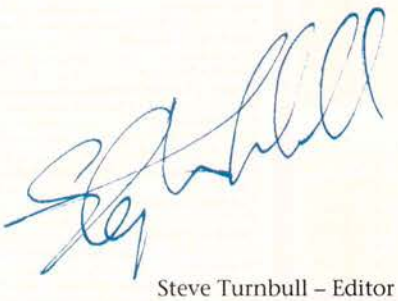
We design, says Acorn, an entry level machine which doesn't have much in the way of expansion capability and we will deliberately engineer it so that it cannot be upgraded to 4Mb. *Why?* Because when the user wants to upgrade he will have to *buy another machine and we'll make more money.*

However, they got it wrong because all that attitude does is annoy people – especially those who bought the machine and want to upgrade. But what happened anyway? Third-party suppliers bypassed Acorn's design and produced 4Mb upgrades anyway, and they bypassed expansion problems and developed other systems. *Why?* Because people wanted it.

The change with the Risc PC is quite radical. The machine is designed with upgrade in mind. With this design of machine you can quite happily expect to hold on to the machine for a minimum of five years, probably seven or eight or maybe more considering how long Acorn machines usually last.

If you want more memory, you add it. If you want a new processor, you add it. If you want more expansion card space, you add it. If you want more drive space, you add it.

Now that's what I call a radical computer.



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Introduction to Classical Music.....£48.00
Inventors & Inventions.....£150.00
ITN European Atlas.....£144.00
World War II Archives.....£144.00

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Wimp Programming for All.....£12.50
Basic Wimp Programming.....£14.50
with Examples disk.....£16.50
BBC Basic Reference Manual.....£19.50

MISCELLANEOUS

A3000 3 Slot & User Port.....£38.00
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Naming conventions

In order to distinguish between the various Acorn machines the standard convention, agreed by Acorn, is that all machines prior to the Risc PC can be referred to as Archimedes machines while the new ones are Risc PC, of course.

Multimedia learning

Computers to teach swimming? Well CD Sports (051-691 0893) are following their Swimming interactive software with a second version which contains a new section for beginners, more sound and faster page turning using Oak Solutions Genesis II. Working on both RISC OS 2 and 3 it costs £39.99.

The aim is to assist non-specialist teachers prepare children for Key Stage 2's requirements of swimming 25m which is due to be introduced this September. Swimming helps children master technique and life-saving and the stroke analysis meets GCSE and PE examination requirements.

Free TVs on offer

ACORN have announced a massive promotion which offers A3010 computer buyers a free TV. Through their dealer network, when you buy an A3010 and take up the extended three-year warranty you'll be offered a choice of two free televisions.

You can choose between Sharp 14in and Bush 20in models which would normally costs £189.99 and £299.99 respectively.

Calculated savings

CIRCULAR Triangles have a special offer on their Calc spreadsheet. For the four months over the summer, Calc will be available for £15 inclusive rather than the usual £25.95.

Calc is a fully RISC OS compliant spreadsheet with around 20 functions, including trigonometric and exponential facilities and various spreadsheet area functions. For further information contact Circular Triangles, 13 Woodhall Terrace, Juniper Green, Edinburgh EH14 5BR.

Risc PC from Acorn

YOU can read all about Acorn's new hardware initiative in our in-depth analysis which starts on page 25. However, what is true about most hardware developments is what can you do with it from day one.

Well, the majority of existing RISC OS products will work on it immediately and a file comes on the hard disk which outlines any problem areas. But what do the major Acorn software players feel about this move?

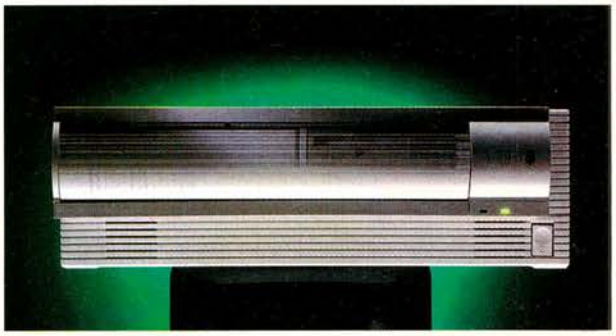
Charles Moir, Computer Concepts: 'The best computer by far that Acorn has produced. Their future relies 100 per cent on this machine. Relative to the sales of other computers, it will not be a success. Relative to Acorn's expectation I expect it will'.

Mark Colton, Colton Software: 'It's a logical development in hardware but no advance in software. It will help the Acornites clamouring for more. People inside the Acorn world will like it – it won't succeed in winning new customers for Acorn'.

Chris Magee, Cumana: 'It will expand Acorn's opportunities both in and out of education and all the indicators show that it will compete very aggressively with the PowerPC'.

Dave Clare, Clares Micro Supplies: 'Initial users will be in graphics, press and publishing but eventually everyone. It is the way forward and if you want to do serious graphics in 24bpp you need 8Mb ram and, most importantly, 2Mb Vram'.

Merlyn, Minerva: 'The Risc PC will make life easier (and cheaper) for everyone. Microsoft currently have a stranglehold on corporate computing and big buyers are spending more on upgrades than it would cost to write their own. Soon someone important will notice and Microsoft's days will be numbered. The Risc PC gives Acorn a chance to take advantage when this happens'.



● *Risc PC: Hailed as the best yet*

Artfully designed

THE graphics capabilities of the Risc PC have led developers to launch 24-bit art packages. Pineapple Software has a new 24-bit art package called FineArt. This uses full 24-bit processing for all painting and processing operations as well as powerful error spreading techniques for displaying the results on standard 8-bit screen modes.

By using Computer Concepts Colour Card Gold, Archimedes owners can also access new 16 and 24-bit screen modes.

Pineapple are looking for a number of volunteers to assess the package and manual and complete a questionnaire on the program, for which they will receive a free copy of the final version. If you are interested contact Jim Daniels at Pineapple Software on 081-599 1476.

Clares Micro Supplies (0606 48511) have enhanced Pro-Artisan to allow it to take full advantage of the Risc PC. As well as being able to use 16.7 million colours for image display and creation, you have realistic tools such as brushes which are able to follow pre-defined draw paths and give work a more professional feel.

Also from Clares is Composition, an image composition program which lets you combine a number of 24-bit pixel based images from a variety of sources. Each image is treated as an object which can then be combined with others using masks.

Each object remains independent but masked objects can cast shadows or have a tint applied which can pass through another 8bpp mask to provide smooth colour graduations across the object.

● *Pro-Artisan: Enhanced version for Risc PC*

Swapping shopping

THE Tesco Computers for Schools scheme is about to launch into its third year. After the criticism levelled against it last year, this year's scheme has some dramatic changes.

This year three companies are involved – Acorn, Tesco and newcomers Thomas Nelson, who recently acquired CD-Rom producers ILP, and the emphasis is on hardware.

Your vouchers can be redeemed against all Acorn machines including the new Risc PC range (for the same number of vouchers as the A5000). In addition, you can acquire CD-Rom drives which nicely supplement the £4.5 million from government for primary schools to buy CD-Rom equipment.

Thomas Nelson brings to the scheme books, cassettes and CD-Rom programs. All in all this gives the scheme a multimedia focus.

The scheme starts on 18 April and ends on 12 June and for every £25 spent you'll receive one voucher. All claims must be made by 1 July with delivery being made in September and October. Vouchers range from 200 for a Flying Boot Big Sound and Rhyme Book and Cassette to 7,000 vouchers for an Acorn Pocket Book 10 Pack – which also entitles the school to a free Pocket Book and an A-Link.

Some items in the catalogue are on special offer, for instance last year a Special Access Pack cost 500 vouchers and this year it is a Star Buy at 400.

Equipment for schools has received some bad press over the last year with TV consumer programmes highlighting the problem areas. Acorn has come out well, the main reason being that they don't view the scheme as a stock dumping exercise but as a way of providing the latest technology that benefits everyone.

Multi-platform

WITH the new launches from Acorn and Apple, the computer trend appears to be for multi-platform computers, which in the publishing field is good news combining speed and ease of use with flexibility.

Alternative Publishing's (041-248 2322) innovative utility ImageFS will probably prove invaluable to anyone accessing files for a variety of machines.

This universal bitmap filter will let you read TIFF, Apple PICT2, Windows/OS2 BMP, ZSoft PCX, Clearfiles, Targa, PBM, Apple MacPaint and Atari/GEM files. Future releases promise CompuServe GIF, Amiga IFF and Ham, Sun rasterfiles, PhotoShop 2.5 and PixelPaint.

For £39.95 you can drag and drop a range of foreign bitmap files directly from a Filer window into any RISC OS application which accepts standard sprite files. There is no additional translation necessary or an intermediate stage and the original is kept intact.

Sensitive tablets

TWO professional graphics tablets have been released for the Acorn machines in A5 and A4 sizes. They use a cordless, batteryless, pressure sensitive stylus or a four-button puck. They connect via the serial port.

The stylus records the amount of pressure you put on the tablet and gives you access to a range of special effects when using pressure-sensitive tools from within programs. For instance, an airbrush varies the spray density depending on the pressure being applied.

The tablet can be used with the mouse or can replace it and the software provides several configuration options such as a reduced tablet area and aspect ratio adjustments.

The software also provides a standardised interface allowing third-party applications to make full use of the tablet and pressure data.

● *Detailed work is possible in art packages such as ArtWorks...*

The development has been the result of a joint project between Vaughan Allanson and Eessox and you can buy the tablets directly from Vaughan Allanson (0638 578597).

The A5 model costs £399 with a stylus while the A4 tablet with stylus and pucks is £549. In addition there is an ArtWorks Pressure Tool for £29 which allows the tablet to be used directly with ArtWorks. This makes use of the pressure data to produce lines of varying width and spectacular effects which can be filled and controlled like any other object in ArtWorks.

● *...with the touch sensitive tablet giving your drawing a more pen and ink feel*

Easy as ABC

RISC Developments (0727 840303) have announced the release of a new source-level debugger for Easy C. Support is included for source and object level debugging, stack trace, breakpoints, single stepping, variable monitoring and memory editing.

A special feature is Profiling which reports the time taken to execute functions, allowing programs to be made more efficiently. Easy C comes with the debugger for £59 and existing users can upgrade for £10.

There is also a new version of Hard Disk Companion available with a new Restore facility which operates like the desktop Filer directory displays. This means you can retrieve single or multiple files by dragging them from the backup. The OS costs £45 or £5 if you want to upgrade.

Networking advance

ACORN machines have always been designed with networking in mind and SJ Research (0223 416715) are taking their networking know-how to the new Risc PC machines with the Nexus Interface Card.

This slots into the networking port leaving the expansion slots free for other cards. In addition, the current production version of the Nexus A5000 Interface Card will work in slots 0 to 7 if needed.

Choice IT

LAST issue we reported on the Active IT Parent Power Weekend run by Superchoice. If you want more details on these weekends – or the courses they run for schools – you can contact Superchoice on 0273 676467.

Z88 link arrives

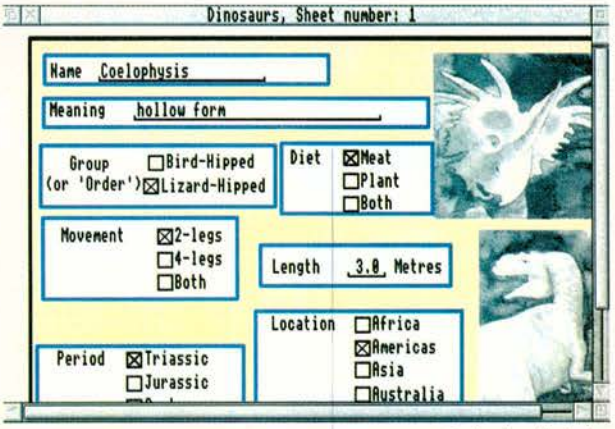
ONE of the many things the Z88 had going for it was that it used Basic and Pipedream, but communication with the 32-bit Acorns was limited. Enter Z-Link II from Really Good Software (0582 761395).

For £24.95 you can access your Z88 files and have a portable computer with excellent battery consumption and a full-sized keyboard. The link requires a special serial lead and the manual lets you design your own, or you could buy one with the software for an additional £9.

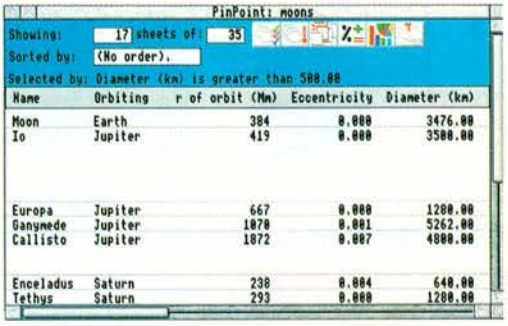
Pinpointing information

A SERIES of PinPoint data stacks and photocopiable support materials have been produced by Longman Logotron (0223 425558) covering a range of curriculum areas. Each disk contains a ready-made database of forms and provides activities to address National Curriculum levels of the datafile topic and data handling.

Called the PinPoint Datafiles, they deal with Key Stages 2/3 and 3/4 using Junior PinPoint or PinPoint 2 and cost £12 per datafile. Topics range from Dinosaurs and Food, Diet and Nutrition to the 1851 Census.



● *Junior PinPoint users will enjoy the dinosaur data...*


PinPoint: moons
Showing: 17 sheets of 35
Sorted by: (No order).
Selected by: Diameter (km) is greater than 500.00
Name Orbiting r of orbit (Mm) Eccentricity Diameter (km)
Moon Earth 384 0.000 3476.00
Io Jupiter 419 0.000 3500.00
Europa Jupiter 667 0.000 1200.00
Ganymede Jupiter 1070 0.001 5262.00
Callisto Jupiter 1872 0.007 4800.00
Enceladus Saturn 238 0.004 640.00
Tethys Saturn 293 0.000 1200.00

● *...or indeed the information on the solar system*

New concepts for old

THE Concept Keyboard Company (0962 843322) have a part-exchange deal for schools to trade-in their old blue Concept Keyboards for a new Universal 2010 for just £99.

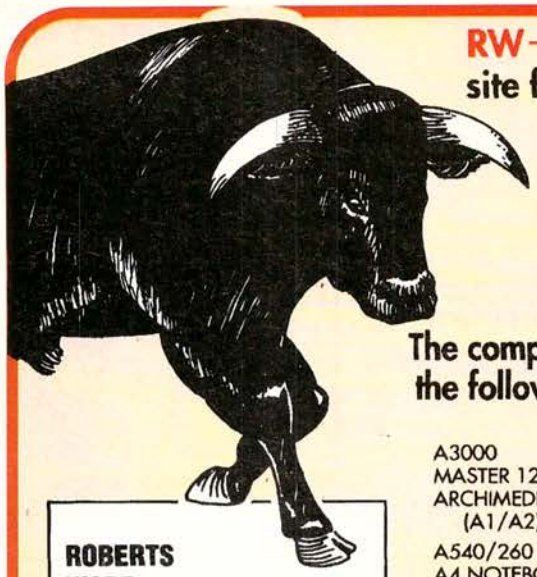
The design is a simple alternative to the qwerty keyboard, the Universal has 256 programmable touch-sensitive keys on

Photo-effects race is on

WITH the launch of the Risc PC the floodgates to professional art tools have been opened and the race is on to find the most professional and intuitive image processing package:

Spacetech (0305 822753) are about to release Photodesk. This is an art and photo-retouching application designed to give access to the most up-to-date techniques used in professional computer graphics. The development came about by the increasing availability of photo-realistic images from colour scanners and Photo CD. All the operations are carried out at studio quality in 24-bit resolution using virtual memory.

The cost of the software will be £169.50 and all popular formats are supports such as Clear, TIFF, Sprite, Photo CD and drawfiles.



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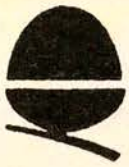

Telephone or Fax for a copy of the catalogue describing your particular interest. *(Please specify)*

RW

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The Company : XOB were the first to market network teletext software for Acorn computers and have supported our clients across three generations of teletext hardware, three generations of Acorn computers and two generations of network technology.

The Price : Further details are FREE, just telephone (24 hrs)

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Castle drives

BEST known for replacement keyboards, Castle Technology (0728 621222) now have a range of IDE hard disk upgrade kits for A3010 machines.

You can choose from 30Mb to 240Mb. The kit is powered internally and consists of a drive cable, rear fixing panel and an installation leaflet ready to be fitted by you or a dealer.

The drive kits start at £120 for a 30Mb drive but if you prefer Castle Technology have a three day fitting service for an extra £20.

Reglazing by touch

THE resolution of the TouchWindow has been increased to 1024 x 1024 for the Acorn machines to give greater precision and smoother operation, and can be used with Conform or the Concept designer overlay files.

The price of the Series 2 TouchWindow is £279 and is available from Resource (0509 672222).

Recording progress

HS SOFTWARE (0792 204519) now have an enhanced version of NStore, the National Curriculum record keeping package. There is now a sophisticated report-writing facility on all aspects of a child's performance such as attendance, classwork, exam percentages, SAT results, behaviour, attitude and progress.

NStore 4.0 includes all the Statements of Attainment in all subjects from Levels 1 to 10 and costs £44.95, though existing users can upgrade for £16.95 including VAT.

Lakeland discovery

FOLLOWING the interest in their Langdale project Creative Curriculum Software (0442 340524) have reduced the price of the two floppy disk projects – Stickle and River – to £49 each.

Primarily aimed at Key Stage 3 pupils, CCS now have teaching materials for Key Stage 2, extending the suitability of the CD-Rom from the secondary to primary sector. Furthermore, if you want to see how well interactive multimedia compares on RISC OS and IBM PC systems, you can do so as both are on the one CD-Rom.

Childsplay

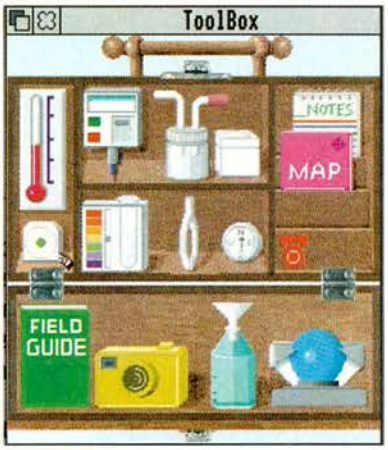
● *Red foxes from the Usborne CD-Rom*

CUMANA (0483 503121) have released the popular story of Goldilocks on CD-Rom. This was produced by the Leeds EdIT Centre with funding from Leeds City Council and NCET.

The program is aimed at Key Stages 1 and 2 as well children with special needs. Goldilocks comes with a wide range of activity sheets and overlay keyboard templates. The theme encourages exploration, reading, writing and listening as well as matching, sorting and counting skills.

The story can be read in the normal way or they can let the computer read to them. Children are encouraged to click on objects to see what happens and activities are integrated as they read. The price is £39.95.

Cumana are also distributing the Usborne Exploring Nature CD-Rom. The activity based CD-Rom and resource is designed to encourage children to explore the environment and is suitable for primary, middle and secondary school pupils.



● *To explore nature you'll need a comprehensive range of tools*

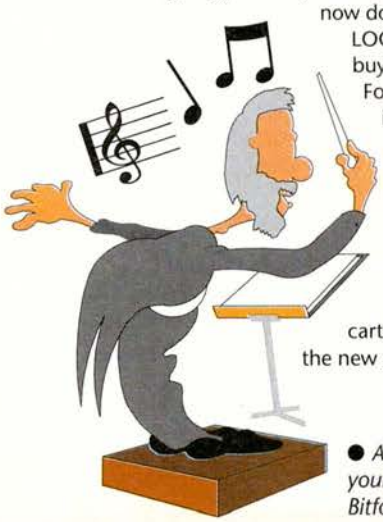
It was developed in association with the Hampshire Microtechnology Centre by Main Multimedia and contains over 850 illustrations and 15,000 pieces of data for £125.00.

For people with CD Roms drives the latest edition of the CDFS driver software for the Acorn is version 2.21 and is now available from Cumana. Prices start at £15 and include support for Photo CD.

Look and feel

IF YOU need Monotype Typefaces then LOOKsystems (0603 764114) are currently offering 50 per cent off all site licences purchased direct. For example, if you want to use 100 Monotype Typefaces (Pack One) on between one and five machines you can now do so for £95 as opposed to £190 inc VAT.

LOOKsystems are also offering a try-before-you-buy scheme for their font management system, Font Directory. You can test the program and if you don't want to keep it can return it within 10 days and you won't be charged anything. If you like it you'll be invoiced for £35.

Due to the success of the Bitfolio Cartoon Collection, LOOKsystems have managed to negotiate a better deal for Acorn owners. The cost of these colourful cartoon capers has been reduced by a third – the new price being £20 inc VAT.

● *Add a little humour to your DTP courtesy of the Bitfolio Cartoon Collection*

Networking news

NETWORKING specialists i³ (0223 566112) have licensed Acorn's Access software for use in their own peer-to-peer product which was formerly know as i³ Accord but has been renamed, at Acorn's request, to Access*flash*.

Access*flash* packages are virtually identical to Acorn's Access packs apart from using the latest flash rom technology. Though this is more expensive than eprom technology it does give you a very flexible upgrade path.

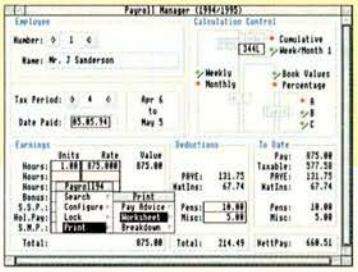
For optimum performance i³ recommend that no more than six stations should be configured in a peer-to-peer style network. As most school networks eventually evolve it will be necessary to convert the Access network to a traditional server-client style of network such as Acorn's Level 4 software.

You don't need to change the Access hardware, just the protocol software in rom will need to be upgraded, not to make it work but to improve performance. Using the i³ system the flash rom is upgraded by a floppy disk or via Email in situ by the network users themselves.

i³ Access*flash* packs are available now with a typical end-user price for the A3000 and A5000 of £145 and £155 for the A3020 and A4000 packs.

Payroll '94/95

SILICON Vision's (081-422 3556) Payroll Manager is now in its third version for the financial year 1994/95. The program costs £99.95 including VAT with an upgrade to the new financial year for existing users of £25. If you have only recently bought Payroll Manager – your registration number is above 940201 – then the upgrade is free.



● *Organising and printing a payroll has never been easier*

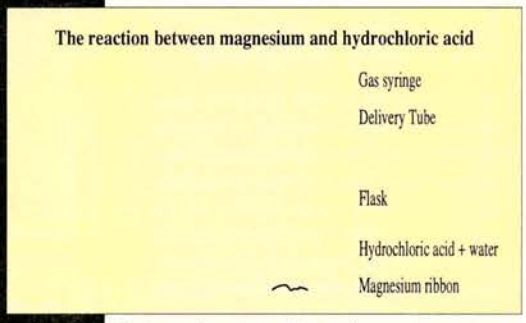
Educated clip-art

MATT Black (0733 315439) have added a new series to their collection of clip art. The ClickArt Education Image Pack provides a library of 2,000 colour drawfiles for only £65. ClickArt is only available for the Acorn through Matt Black, with the California-based company already well known on the PC and Apple Mac platforms.

There are over 40 categories from Animals to the Zodiac and have been designed with teachers in mind. A printed index is included with the pack as well as Hugh Eagle's !PickAPic image finder application.

PTW Software (0329 281930) are also adding to the clip-art pool with their Technical Clip-Art Collection. At £7.50 it actually provides more than drawfiles, as it combines a comprehensive chemical apparatus library with circuit figure symbols and a PCB symbol library.

In addition, the manual shows how you can use the PCB symbols with DrawPlus or Vector to produce a simple but powerful and low cost PCB design method.



● *Experiments such as the magnesium and hydrochloric acid reaction are ready-drawn for you*

Diary Dates

† The Acorn Computing editorial team will be at these events

Beebug Spring Open Day †
Sunday 8 May, 10am to 4.30pm
RISC Developments, St Albans
Contact: Beebug (0727 840303)

Lindis Computer Carnival †
Saturday 11 June, 10am to 4.30pm
Norfolk County InSET Centre, Norwich
Contact: Lindis (098685 476)

Acorn World '94 †
28-30 October, Wembley, London
Contact: ESP (0295 788386)

Computer Graphics Expo
8-10 November
Wembley Exhibition and Conference Centre
Contact: London Effects and Animation Festival (081-995 3632)

Rom with a view

LONGMAN Logotron (0223 425558) have a new CD-Rom visual resource database called Landscapes. This contains over 2,000 colour photographs and images of nature and the environment.

Each image is cross-referenced and can be accessed, displayed and imported into other applications using the resource management system, Photobase.

Photobase allows you to search and retrieve the Landscape images and each indexed image has its own index card containing a miniature representation of the sprite file, text panel and a keywords list. You can search for the images you want using the text or keywords and compile film sequences.

Photobase has been chosen by NCET as part of the £4.5 million scheme to provide primary schools with CD-Rom hardware and software. Photobase is copyright free for non-commercial use in a school which, for instance, wants to catalogue computer images and sprites.

Landscapes costs £49 and is the first of a whole series of Photobase CDs with planned releases covering images from the 20th century and scientific resources.

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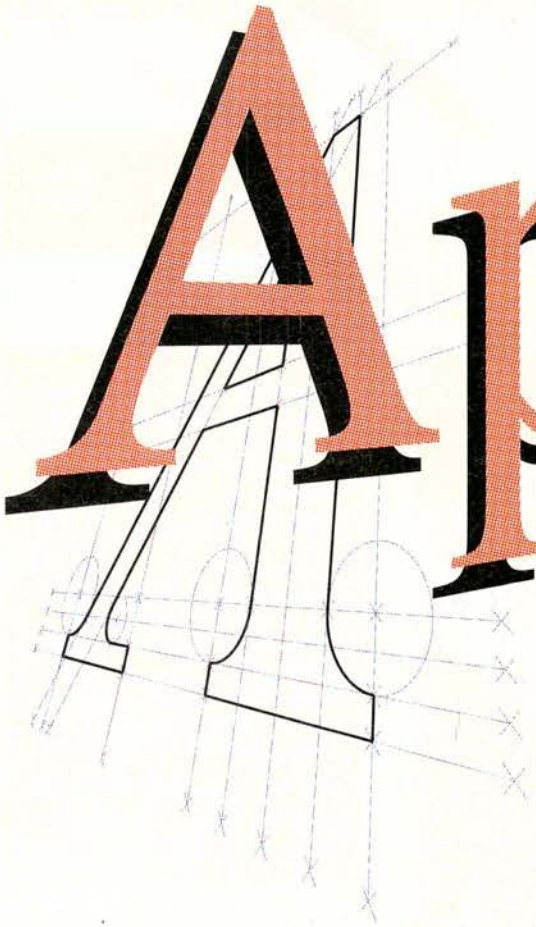


Apollonius PDT

Computer Aided Design

Spartan Simplicity

Olympian Power

Apollonius PDT is probably the easiest to use CAD system there has ever been, and yet has comprehensive geometric construction facilities, combined with realtime interactive parametric geometry - just drag a component and the entire drawing and its dimensions automatically adjust to suit. Can be used for technical drawing, mechanical simulation, animation and much more.
Apollonius PDT costs £150 +VAT. Upgrades from Oak PDT and WorraCAD £75 +VAT.

OAK SOLUTIONS

Oak Solutions Dial House Chapel Street Halton Leeds LS15 7RN Tel: 0532 326992 Fax: 0532 326993

Take a Risc

Mike Cook and Steve Turnbull take apart Acorn's new box

IT'S been three years since Acorn released the A5000 and that is an age in computer terms. But what Acorn have been working on has taken that long to come to fruition. It's been through two redesigns and, perhaps most importantly, it marks a complete re-think in Acorn's policy towards their designs.

When the A3000 was released it was deliberately engineered to prevent upgrading to 4Mb – under the curious assumption (for which there was no evidence) that if people wanted a bigger machine they'd buy a new one – but third-party suppliers ignored Acorn and produced 4Mb expansions anyway.

Likewise the A3010, A3020 and A4000 were built to stop certain types of expansion but third parties did it anyway – because people wanted it.

It appears that, finally, Acorn have learned that the way ahead is not to prevent people from buying a computer – because who wants to buy a machine with built-in obsolescence – but instead make something that will be all things to all people and can be tailored to do just about *anything*.

Acorn have finally built a computer that not only has future-proofed software but, to the limit of practicality, has future-proofed hardware as well.

New look

The first thing that grabs you about this new machine is the way it looks because it's quite radical. Despite the tantalising black boxes on show at Acorn World '93 and BETT '94, the finished designs are *cool grey* and, as with the original BBC Micro, come from Cambridge Product Design.

The casing is made of moulded plastic which, for the chemists out there, is a mix of ABS and polycarbonates and, for anyone interested in military hardware, is what riot shields are made of. The box is also very light because instead of having a metal casing the inside is metal-sprayed to cut down electrical emissions to within the correct standards.

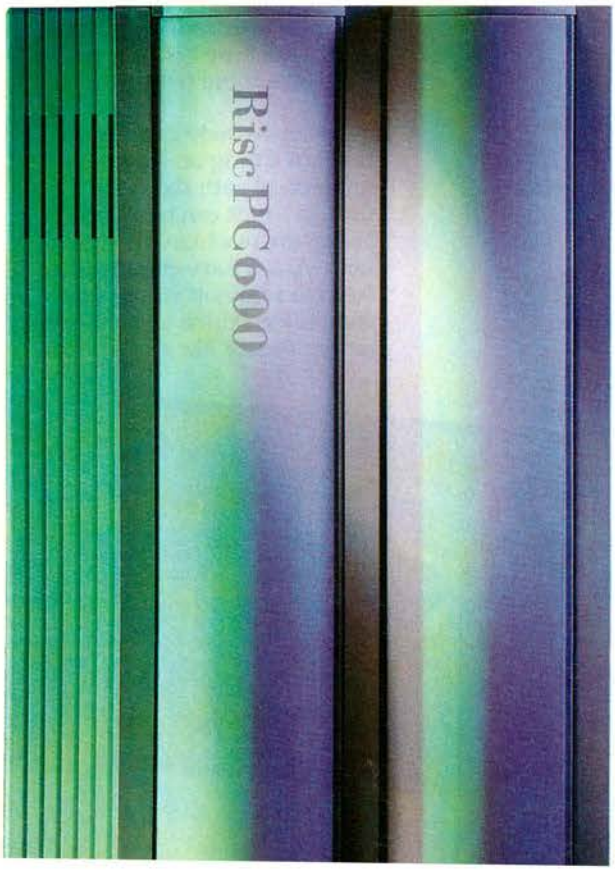
The main unit has about an inch of base and then expands into the first *slice* (detailed later). This has a rounded cover which is spring-loaded so that it's either open or closed.

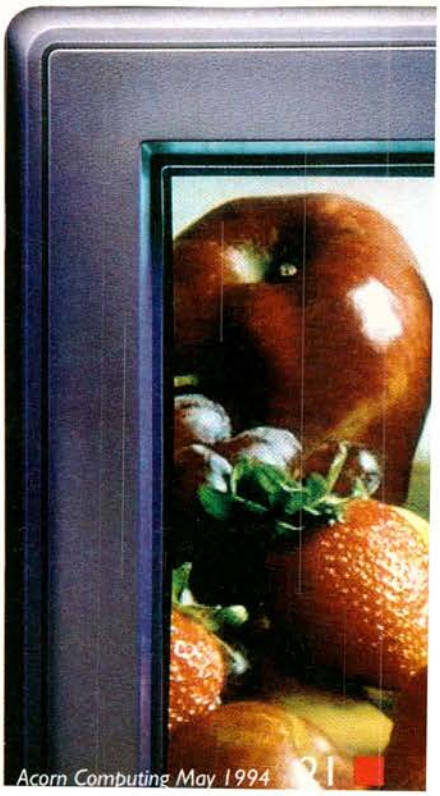
The cover has the name of the machine on it – Acorn Risc PC 600 – and when opened reveals the single 3.5in floppy drive and the 5.25in drive space, which could be a CD-Rom drive.

The cover is there to maintain the smooth appearance of the machine because if you add additional drives their colour may not match perfectly, so the imperfections will be hidden by the cover.

At the back of the Risc PC are all the expected connectors – including a separate mouse socket as the mouse no longer plugs into the keyboard – and space for two expansion slots. There's no longer any need to take the machine apart when adding cards because there are guides along each side that ensure the card's connector plugs straight into it's socket.

The Risc PC may have been designed by the company who designed the BBC Micro but whereas that casing included screws – though they never retained their lids for more than half a day – the Risc PC box positively invites you to take off the lid and, apart from the expansion cards, there are no screws – just take a look at the ➤





● *Taking the Risc PC to bits*

sequence of photos showing how these boxes are opened.

You can take the machine apart in seconds. The top is held on with two twistlock pins and the body section by two more. Just unclip (yes, un*clip*) the floppy drive and lift off the body revealing the PCB and power supply. If you have expansion cards they must be removed before doing this

One of the ways to think of the Risc PC is in *slices*. Your first slice holds a 3.5in drive and one 5.25in drive – for a CD-Rom for instance – and up to two expansion cards.

If you need more you simply add another slice, giving you access to two more drive mounts and two additional expansion slots. You can keep adding them up to a current maximum of six, although you may have to upgrade the power supply depending on what you're running – that's easy as well.

It is *so* easy to plug cards in and out and take the whole thing to pieces that you might think that in, say, a school environment security may be a problem. This is not so, because if you need them there are padlock holes built into the twistlock pins which marry up to holes on the main unit and there are also holes under the body for bolting the whole thing to the desk or floor.

The main body can have the monitor sitting on top – bit impractical with six slices though – or it can be placed beside the machine or on the floor. Acorn have even gone as far as to supply it with special clip-on feet which allow it to be put on its side like a tower unit, although with six slices it becomes more like a bookcase.

The desktop

In some ways, after the radical outward design the desktop is rather uninspiring. It looks pretty much the same as all previous desktops, and so it should as it's still RISC OS 3 – but now it's version 3.5. However, if you look a little closer you'll start to see the differences.

The first obvious change is the NewDesk desktop which adds a proportional font to the desktop, replacing the System font used on earlier machines. It also gives the 3D-sculpted window furniture and the ability to have a tiled background to all windows – there's a default marbled pattern that matches the rest of the desktop but every window can be different.

NewDesk also enhances the Filer so that the column width of directory windows is adjusted to take into account the width of the filename. This means that on such things as CD-Roms, which don't have the built-in limit of 12 characters in a filename, you'll still be able to see the whole name. In addition, when the MacFS finally arrives you'll be able to use long Mac names as well.

The enhanced video performance offered by the VIDC20 controller chip means that the machine can handle thousands of new screen modes. Of course it's no longer practical to have a numbering scheme for screen modes, so there's a new Display Manager that replaces the *Mode* option and sub-menu on the palette icon.

Click on it and you can select the number of colours you want

and the screen resolution. The menu of screen resolutions is set from a *monitor definition file* and there's a different one for each monitor type.

Quite simply you select the definition file for the monitor you're using, with the !Configure program, and from then on the Display Manager will offer you the resolutions listed in the file. The only limitation is that you have to have enough memory available to show the mode, and if you don't have *Vram* (Video ram) no mode can use more than 1Mb of memory.

Apart from the Display Manager there's now the problem that you can choose from up to 16 million colours. The old Palette just isn't up to the job so there's a new Colour Picker which is now the standard way to choose colours across different applications using three different colour models – RGB, CMYK and HSV.

The great thing about the Colour Picker is that it lives in a module by itself and *any* application program can use it without having to have the code and window templates built-in.

The Colour Picker lets you work in:

- RGB – Red, Green Blue – The traditional computer colour model
- CMYK – Cyan, Magenta, Yellow, Key (black) – The printers' model used to create colour separations
- HSV– Hue, Saturation and Value – Generates colour the way an artist mixes paint

The Applications folder is still on the iconbar but the contents are different. Draw, Paint and so on can still be loaded from here but they are no longer held in the rom.

This is possible because all machines are now fitted with a hard disk as standard, so rather than tie up the rom with programs which cannot be updated they have been moved to the hard disk and the rom space used for the new features.

The logical extension of this is that you can now specify which programs you want in the Apps folder – just change the contents of the directory on the hard disk.

As well as the well-known applications there are some new additions, namely: ARPlayer for Acorn Replay files and the new improved all-singing all-dancing version of ChangeFSI. You get over 100 colour images supplied in the standard JPEG format which, when double-clicked, are loaded into ChangeFSI and converted to sprite files.

File locking has also been incorporated allowing you to lock the system so that no one can change or delete any files on the computer until they have entered a password – except that a folder called *Public* is exempt and it can be accessed while you're away.

RISC OS is still found in rom leaving the standard 210Mb hard drive to deal with data. If this is not large enough for you there is the 420Mb model. But dealers and the modular approach of the Risc PC means that the sky's the limit.

How green is your PC

According to a recent directive, a so-called *Green PC* must, to save energy, take 30 watts of power when switched on but not in use. This limit presents Acorn with something of a problem, after all the Acorn Risc PC only uses 10 watts... perhaps they need to increase it?

Memory

The quantity of ram that the machine can handle has been increased from the paltry 4Mb to 128Mb – plus an additional 2Mb in Vram – and RISC OS 3.5 is capable of handling up to 256Mb. All we're waiting for to go the whole hog is for the commercial availability of Single In-line ➤

● *The sockets from right to left are: serial port, parallel port, network connector, keyboard, mouse, monitor, headphones and reset button*

Memory Modules (SIMMs) large enough.

Just to give you an idea of typical costs of SIMMs in the *real* world these are what you would have to pay for more memory if you owned a MIPS R4000 which is another RISC-based computer: 8Mb is £300, 16Mb is £500, 32Mb is £1000, 64Mb is £2100 and 128Mb will set you back £4200 – most companies will give money back on your old SIMMs and prices will fall over time.

The Risc PC is the first RISC OS platform to allow SIMMs to be fitted as the standard memory and you can expect the prices to be similar to those above *because* they are standard(-ish) parts.

Two SIMM sockets are provided and any combination of standard 70ns or faster, 32-bit SIMMS can be used with either of the sockets left empty. Each SIMM socket is a standard 32-bit wide 72-way connector.

Then there's the extra 2Mb of Vram, what's this for? It's pretty well known that if you use a screen mode that eats a lot of memory your computer slows down because the processor has to look after the screen as well.

If you have Vram the screen memory is put in there and the processor *does not* have to look after it, so it runs at the same lightning speed regardless of the screen mode.

A neat point is that when Vram is fitted and the computer is using a screen mode which doesn't need it, all the unused Vram is available to the operating system as extra memory. So you could buy, say, the lowest spec machine and add the Vram to give it extra speed and memory and still get the benefit of the extra memory.

On the software side there have been some changes to memory handling, although it's not visible to the user. The kernel is the core of the operating system and is the one bit you can't change.

Previously it dealt with managing the memory into dynamic areas – for such things as fonts, ram disk, system sprites and so on – and an application space. This left the Wimp to deal with a free memory pool and organise the multiple application spaces for each multitasking program.

The change is that the Risc PC's kernel handles the free pool and the Wimp looks after the multiple application spaces and is responsible for constructing and managing tasks in the desktop. The Wimp's operation is simplified as it no longer needs to maintain its own free pool. It's more logical this way.

Input and output

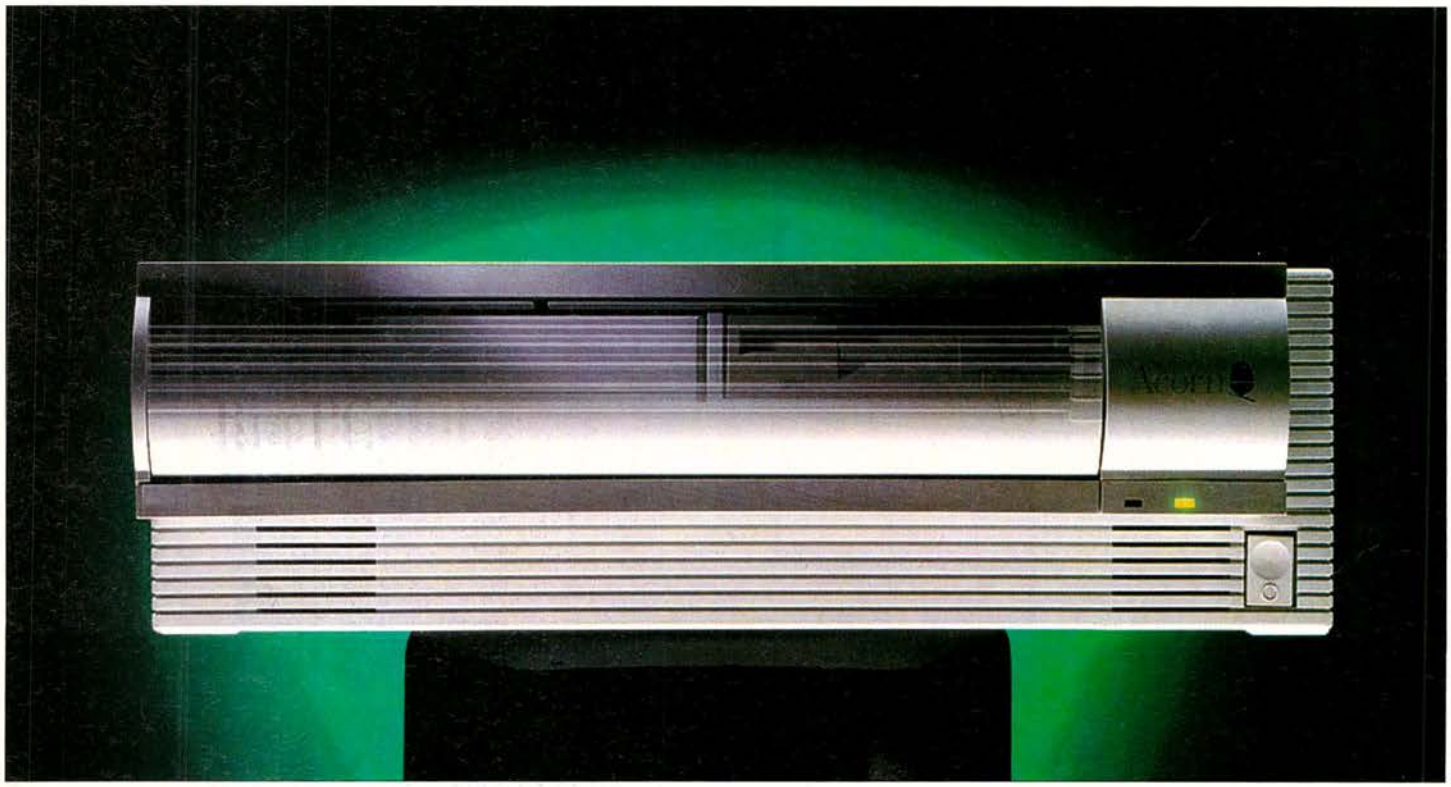
To say that the new machine now gives 24-bit colour output is actually doing it an injustice because it can actually provide *32-bit* colour. This works as follows: From those 32-bits you have 8-bits each of red, green and blue, plus another 8-bits of *effect* which can be any video input or control.

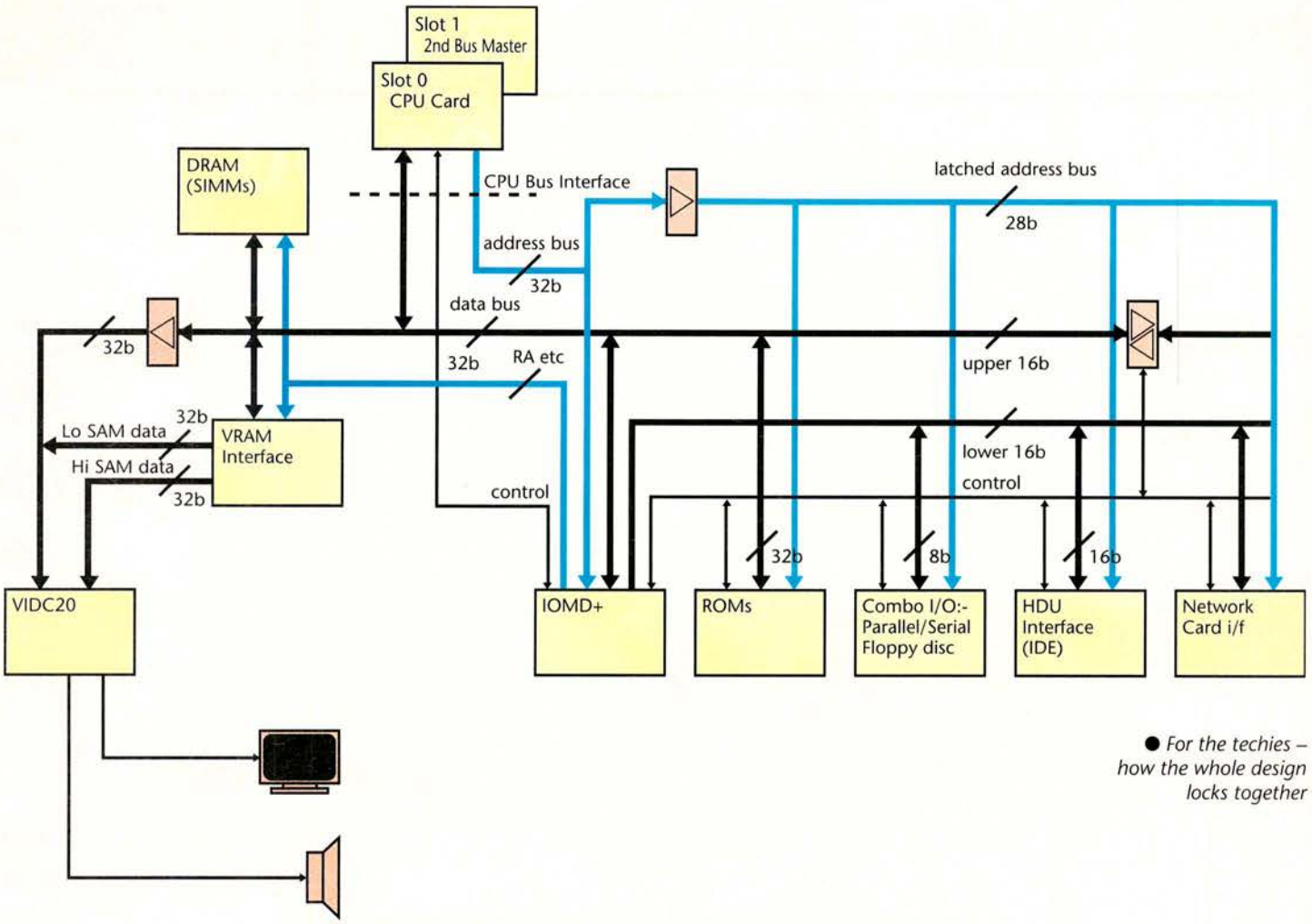
In true Acorn style, the 8-bits of effect are currently only 4-bits, leaving the rest for future expansion, but it means that you could, for example, have a 16-level fade between pictures in two screen banks on the machine.

Or, given the hardware, you could mix the output with live video to overlay the computer image. The Risc PC has incredible potential in the graphics arena.

So what kind of screen modes is the machine capable of? You can have up to 16 million colours at SVGA resolution (800x600 pixels) if you have 2Mb of Vram, or you could opt for

● *The front cover of the slice is sprung open or closed*





● *For the techies – how the whole design locks together*

the higher resolution of 1280x1024 in four levels of greyscale with no Vram or 256 colours if you add 2Mb of Vram – the XGA standard.

These PC designations of graphics capability – VGA, SVGA and XGA – are, of course, extremely limiting. This is because the whole point about Acorn computers, all the way from the 8-bit BBC Micro, is that you can alter the screen mode your machine operates in without having to restart your machine afterwards, and you have always been able to tailor the screen to your own requirements (though admittedly it wasn't very easy on the 8-bit machines).

This concept of screen modes is completely alien to other machines where the screen modes are fixed and limited. However, using terms like SVGA and XGA gives a reference point for comparison as the average PC user has trouble comprehending the concept of *tailoring the screen resolution and colours to your requirements*.

There is also a specially designed 70Hz Replay mode of 480x352 pixels for full-motion video. This can display up to 16 million colours with 1Mb Vram and 32,000 with no Vram. The maximum pixel rate achieved is 110MHz and memory bandwidth into VIDC is at least 38Mb/s with no Vram, rising to 76Mb/s with 1Mb and 152Mb/s with 2Mb.

When it comes to displaying everything on screen the Risc PC supports Display Power Management Signalling (DPMS) with the AKF60 monitor. This is a proposed VESA standard for reducing or cutting the power to the monitor when the computer is not being used.

The serial and parallel devices have been changed with the bi-directional parallel printer port capable of being opened either for input or output, just as if it were a file. The speed of the serial port has been increased to 115kbaud in the Desktop which is excellent news.

The keyboard interface has been removed from the kernel and replaced by a standard PC AT-style keyboard driver as a separate module. The standard Acorn quadrature mouse driver is now also a module and several serial mouse drivers have been added to allow a PC-type mouse to be connected to the serial port.

Furthermore you can add your own keyboard and mouse driver modules to cater for a wide range of alternative input devices.

You can select the type of mouse and keyboard driver you want to use from a menu supplied in the !Configure program – the menu expands as you add new drivers and it's another example of the power and

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The unique advantage of the 602X and 604X is the built in six disc magazine and autochanger — in other words these drives do the job of six separate CD-ROM drives. With the number of CD-ROM titles rapidly increasing, these drives are the simple and cheap alternative to wasting time swapping discs or buying more drives. It's an ideal solution for networks, since this allows six discs to be available on the network, from just one drive.

Both drivers are multi-session PhotoCD compatible — they can also play standard audio compact discs and for added security the magazine can be locked into the drive.

The 604X uses Pioneer's unique technology to completely overcome the speed problem associated with many CD-ROM drives — by rotating the disc at four times the normal speed, the 604X can achieve a sustained 600 KBytes/Sec transfer rate which makes it the only solution for users who regularly transfer large files, such as PhotoCD images. The 602X offers double speed — a sustained rate of 300KBytes/Sec.

The package includes the drive and Computer Concepts drivers, manual, all cables, PC & Mac drivers and a free copy of Computer Concepts ArtWorks clip-art CD (containing over 700 examples of work created in ArtWorks, dozens of 24bpp photographs, a demo version of AudioWorks and some sample audio files).

DRM-604X: £999.00 + £10 carriage + VAT (£1185.57 incl.)

DRM-602X: £499.00 + £10 carriage + VAT (£598.07 incl.)

Both drives are suitable for any model of Acorn RISC computer with an Acorn compatible SCSI interface. They require CDFS 2.2 (contact your SCSI board supplier if you require an upgrade).

The 604X — *MacWorld 'Editor's Choice for the Best Performer' July '93; PC Magazine 'Editor's Choice for Networks' Dec '93; PC Computing 'Most Valuable Product for Multimedia Hardware' Dec '93; BYTE Magazine 'Award of Merit' Jan '94; Personal Computer World 'Best CD-ROM Drive' Feb '94; Personal Computer World 'Editor's Choice' April '94*

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versatility Acorn have built into this machine.

Multimedia specific

IT is now possible for your CD-Rom drive to be integrated into your machine and with the new abilities of software and hardware, Acorn see the Risc PC as a *real* multimedia machine. In particular: Full 24-bit colour capability, Photo CD support, expansion bus, stereo sound as well as Replay and the ARPlayer.

The standard Risc PC has an empty 5.25in drive bay ready to receive the optional CD-Rom drive and interface card which together provide a neat integrated solution. Both RISC OS and Dos CD-Roms can be used – if you opt for the optional PC card, of course – and Replay movies can be played from CD-Rom and images copied from both RISC OS and Dos disks via ChangeFSI if necessary.

The educational opportunities created by Photo CD are enormous and the CD-Rom drive will let you read Kodak Photo CD disks, while the video performance ensures that none of the original picture quality is lost. Once displayed, the images can be edited and dropped into multimedia and DTP packages as you want.

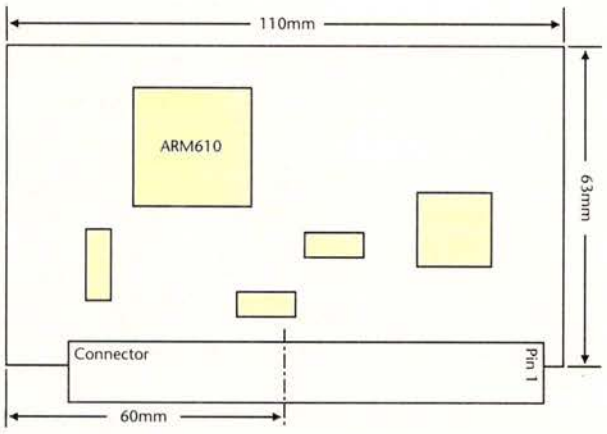
The sound capabilities of the Risc PC have increased but the basic sound is much the same. There are eight channels of stereo sound now with an improved noise filter with a steeper cut off at higher frequencies than before.

Speaker and stereo headphone sockets are built in and you'll be able to use existing sampling and MIDI interface cards. Furthermore, a 16-bit CD quality sound card is under development and a little bird tells us that this will provide MPC (Multimedia PC) audio and a subset of the Soundblaster card for PC games – useful if you want to utilise a PC as your second processor.

Replay – despite the views of Mr Gates at Microsoft – is a true full-motion video system which is streets ahead of the opposition in usability, price and availability and it works on all Acorn 32-bit machines regardless of age – not something that can be said for the PC equivalent and has allowed thousands of users to put together multimedia applications on Acorn computers.

The playback system, ARPlayer, is included, with every Risc PC together with a number of movies demonstrating the capabilities of Replay.

● *Each processor card is very small*



Expansion cards

A term you'll hear touted a lot in the next few months is the DEBI bus or the DMA (Direct Memory Access) Extended Bus Interface. This is the bus that the expansion cards plug into and, on the earlier machines, the interface had a width of 8-then 16-bits.

The Risc PC has increased that width again to 32-bits, but the software is intelligent enough to spot old expansion cards which will still behave correctly.

Again, on the old machines, only 4k of the memory on the expansion card could be mapped into the memory of the machine, but with a full 32-bit DEBI card this goes up to 16Mb.

This 16Mb address space is known as EASI (Extended Acorn System Interface) space, which means that data held on an expansion card in rom or ram can now be read or written to directly, without the previous limitation of 4k chunks. The effect of this is that data transfer between the card and main memory is very much faster.

Not only that, but the DEBI bus also supports Direct Memory Access so that data can be read from and written to system ram by expansion cards, without interrupting the main processor.

Together, these features make it possible to implement even higher performance expansion cards, handling large amounts of data such as video capture and direct-drive printer cards which can have substantial on-board buffer memory which is now addressable directly by the processor. Existing cards – which have conformed to Acorn specifications – will still be supported.

Another feature of the Risc PC, which illustrates Acorn's departure from their previous policy, is that every electronic signal on the

Table of Dhrystones

Machine	MIPS	Dhrystomes		
		Screen mode		
		0 (480 x 240)	SVGA 16-col	SVGA 256-col
A4000 12MHz	6	11	7	3
A5000 25MHz	12	22	20	10
A5000 33MHz	15	26	23	13
A610 30MHz	26	39	36	25
A610 1MB VRAM	26	40	40	40

motherboard that any third party might possibly be interested in has been made available on a socket somewhere.

It might mean that the inside of a greatly expanded machine could come to resemble a large plate of spaghetti *but* it also means that the possible additional hardware is limited only by the imagination – if you want to do it you probably can.

Dual processor open bus

The 30MHz ARM610 is mounted on a daughter card and connected to the PCB via a 96-way DIN socket – similar to the way the ARM3 was mounted in the A540. However, alongside is an identical connector for a second processor card.

As well as being the first Acorn platform to offer support for more than one CPU, a new set of ARM data address and control signals support a second processor on the processor bus – the Open Bus.

The second processor is able to share resources such as memory and I/O with the main processor, so you don't have to provide duplicate memory and I/O systems when fitting a second processor. The benefits are obvious for cost, space and power consumption.

You can use any processor provided that its card contains all the necessary arbitration logic, as the host card only contains the ARM itself and clock generation.

The second processor card must also convert its own bus protocol to that of the Open Bus which will usually be performed by an Application Specific Integrated Circuit (ASIC).

What can you have? Well, you could have another ARM to provide a degree of parallel computation or a dedicated chip such as a DSP (Digital Signal Processor) engine for speech I/O or image processing, network management or graphics processing such as with an MPEG video processor.

Or you could opt for a *foreign* CPU such as an Intel chip like a 486 or a Pentium. As both cards have full access to the machine's resident memory and I/O, an 80x86 Intel processor permits a very cost-effective and high performance DOS support system to be implemented.

Furthermore, if you wanted to upgrade the chip it would be cheaper and easier to do it on the Risc PC's second processor than it would be to upgrade your standalone 486DX to a Pentium...

RISC OS and Windows

The Open Bus represents a tremendous cost advantage over traditional second processors mounted on an expansion card which needed memory to be duplicated. The first of these second processors will be a 25/33MHz 486SX PC card costing £99 including Dos and Windows if bought with the machine.

With a PC card fitted your Risc PC will behave like an ordinary 486PC with Windows and a graphics accelerator card offering SVGA video – 800x600, 16 million colours – and able to run most (if not all) Windows applications.

A special ASIC (Application Specific Integrated Circuit) embodies all the speed-dependent PC logic, reducing the load on the *host* ARM processor. Performance will be further enhanced by an optional 32k or 128k secondary cache on the processor chip, which will be managed by a cache controller included in the ASIC.

The same ASIC will produce signals to allow standard PC expansion cards to be used via a special adaptor.

When you are running native RISC OS on the ARM as well as using the PC Card, the Task Manager will let you set priorities when allocating processor bus time between RISC OS and PC processes.

Later versions of the PC Card will offer XGA graphics (1280x1024x256 colours) and support will be given for Novell networking, SCO UNIX and other operating systems. Under development are even higher performance PC cards using the 100MHz 486 DX/3 and P24T Pentium processors.

ARM610 – the first of many

AT the heart of the Risc PC is a new 30MHz ARM610 which, unlike its predecessor the ARM3, is a 32-bit RISC processor with a 4k cache. In addition, the processor of the ARM610 includes a write-back buffer and Memory Management Unit (MMU) using a 4k page size on the same silicon.

These features increase the average execution speed and reduce memory bandwidth required by the processor. This allows the external memory to support additional processors and Direct Memory Access (DMA) channels with minimal

Processor upgrades

When Acorn introduce a new standard processor in a Risc PC they will, within three months, produce a processor upgrade card. The prices given here are *guaranteed** by Acorn – you unplug your processor, send it away and the new processor returns in a couple of days.
If you can't lose your machine for that long you can pay a bit extra and get the new card without having to send back your current one.
The processors given here are the ones that Acorn expect to release in the next two years, the faster ARM610 and ARM700 are expected by the end of 1994. Therefore, you might expect upgrades to appear every six months or so.

New processor Old processor	>30MHz ARM610	40MHz ARM700	>40MHz ARM700	Standard ARM800	High performance ARM800
30MHz ARM610	£75	£100	£125	£150	£175
>30MHZ ARM610	-	£75	£100	£125	£150
40MHz ARM700	-	-	£75	£100	£125
>40MHz ARM700	-	-	-	£75	£100

* Price increases to the maximum of the Retail Price Index are part of the guarantee, so these are the prices *now*, but they may increase at the same rate as inflation but no more.

performance loss.

The ARM710 will be launched later this year with an 8k cache, enhanced write buffer and a memory Translation Look Aside Buffer (TLB) doubled in size.

Subsequently, it is expected to be able to offer an ARM700 with FPA (Floating Point Accelerator) support followed by a 43MHz ARM700 version on 0.6 micron silicon and beyond that the ARM800.

The ARM610 is extremely energy efficient, consuming significantly less (and costing a lot less) than processors with similar performance from other manufacturers.

The ARM600 uses 0.8 watts and costs £12 (in quantities of 20,000 units), the 486/66DX2 uses 5 watts and costs £160, the Pentium uses 15 watts at £380 while the PowerPC uses 8.5 watts and costs £220.

The new processor gives the Risc PC exceptional performance when it comes to the high resolution graphics modes – when fitted with Vram – working approximately twice as fast as a 25MHz A5000 in 16-colour VGA mode.

It's important to remember that because the processor in the Risc PC is on a board it *can* be upgraded, so buying a Risc PC does *not* limit you to that machine forever – the box may not change but everything else can.

Using existing programs

Each machine comes with an application called !Products, which is a database giving information about running existing RISC OS applications.

Acorn report that 75 per cent of existing programs will run without problems, but some will need a different configuration, a few will need upgrading and a small number will not work. Products tells you the details of about 800 titles.

As a rough guideline the majority of products produced for RISC OS 3.1 will work without problem. In some there may be minor imperfections such as menu options being out of line because of the proportional font now used.

The next group covers about 10 per cent of titles, where small changes such as resizing the WimpSlot need to be done. These changes can usually be done by the user.

Another 10 per cent of titles fall into the upgrade category and Products will indicate where these are available. This leaves old 6502 BBC software and games with unauthorised interfaces.

You'll find some helpful modules already in the Utilities directory, such as the ones for Advances, DDE and PC Soft – which will run much faster.

No risk Risc PC – Mike Cook takes the lid off

The Risc PC from Acorn introduces what they call a *major sea change* in all capabilities. Just what are they and how do they affect all of us *Acorn computers*? There is so much to say it is difficult to know where to start.

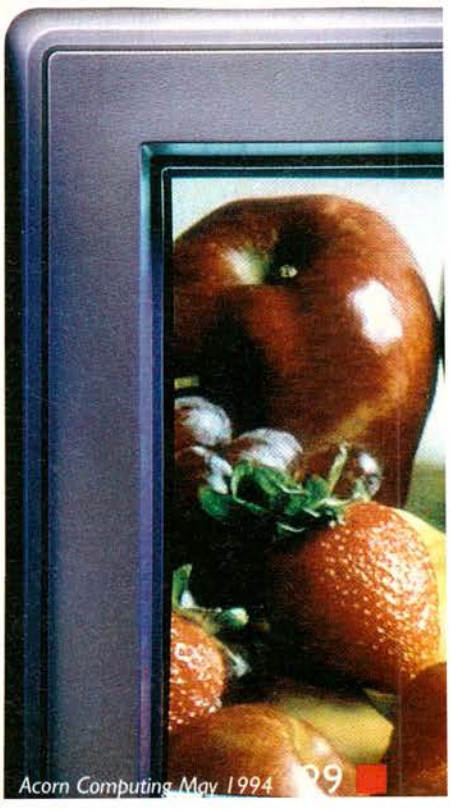
Well from my point of view the most exciting thing about these new machines is the new attitude coming out of Acorn. The philosophy and design of this machine is such as to make upgrading as easy as possible. That's not only official upgrades but also any third-party developments.

In the past, Acorn have produced a product range with a gradually increasing range of capabilities. Then, some third party has had a great idea for some internal widget, to add a board here, cut that off and stick it there, and wow, a better machine.

That's all very well until another clever idea comes along and you can't get the two to work together, not to mention making a mockery of the originally designed product range.

Well, this new beast has been designed from the outset to be easy to upgrade, so easy in fact that a complete machine can be stripped down and re-built without even a screw driver. When I went to look at it before the launch I was invited to strip one down. *See, even you can do it,* beamed the Acorn rep.

Well, I think that, as someone that can strip a Model B down to its component parts in 45 seconds, I *should* be able to do it, but I saw what he meant. The box is cleverly put together with ➤



➤

catches and clips and was a total doddle even on first sight. Well you can't say that for any other Acorn machine.

The box design takes expandability into another dimension, namely up. When the need arises for more of anything you simply add another slice and the box gets higher. Just like counting rings to get a tree's age, counting the slices on you computer will soon be able to tell you something about it's age or wallet depth of the owner.

Each slice you add will give you space for a 5.25in device like a hard disk or CD-Rom player, a 3.5in device like a floppy drive or optical drive, as well as two extra podule slots.

The only slight drawback is that the old expansion card backplane has to be discarded for the new one but that is inevitable as the strategy of plugging in extension backplanes is an electronic non-starter.

The other main areas of upgrade are the memory and processor. The memory can now be expanded, in theory, to 256Mb. I say in theory because no one has produced chips that large yet, but give them time. Acorn have built in two SIMM sockets for memory expansion, that may not sound a lot but let me explain.

Other computers have been using SIMMs for many years to handle memory expansion but they are relatively new in the Acorn world. A SIMM is a Single In line Memory Module and consists of a small double-sided printed circuit board with surface-mounted memory chips.

Memory upgrade is just a simple matter of replacing this module. No IC pins to bend under or get precisely aligned. SIMMs come in various sizes from 512k to 32Mb (at the moment) and the price varies quite dramatically as well. So memory upgrade will simply be a matter of choosing the amount you can afford and plugging it in.

It is worth noting that this memory may be taken from other manufacturer's computers, it is one of those rare cases of an industry standard. How long that will last is anyone's guess.

Therefore, in this new machine you can have as much memory as you can afford. In the Macintosh market there is a board that allows you to use several smaller and so cheaper SIMMs in the one socket and there *is* enough head room in these new machines for that to work.

However, it is in the range of processor upgrades that the Risc PC really excels itself. The processor is on a small plug-in board, making it very easy to upgrade when a new one comes along. Initially you get an ARM6 running at 33MHz, then perhaps by Christmas there will be the ARM7.

Finally, on the drawing board but not yet in silicon is the ARM8 to boost the performance even more. Add to that the option of a floating point processor and the raw power upgrade path is good – it's *very* good.

Acorn have always been excellent at providing backward computability – there is a second processor slot for you to install a backward processor like a 486. Unlike the PC boards on the Archimedes machines this processor has direct access to the bus, memory, memory manager and video circuitry.

Therefore, at the click of an icon your machine is a PC clone, no emulation, no video bottleneck. This will be a great selling point even if, like me, you don't intend to use it at all.

The second processor idea is not to be confused with the second processors developed on the old 8-bit machines. These were, in fact, separate computers using the original computer only for input, output and file handling. This second processor should perhaps more accurately be called an alternative processor and could, in theory, be anything.

I have heard that a Pentium board is being developed and a signal processing chip is under consideration. This processor could even be another ARM chip to allow some interesting applications in parallel processing. So with a RISC chip and a 486 you can be both on the leading edge and the trailing edge of technology at the same time.

There is another sort of memory available on this machine that will be new to users of Acorn machines and that is Vram. Now, the trouble with designing a computer is that the processor and the video display have to access the same memory. This can cause trouble if they both want to access a different address at the same time.

The 8-bit machines got round this problem by what is known as interleaved access: The display circuitry had access to every other clock cycle with the processor having access on the other cycles.

This was fine at the time as the memory could be accessed at twice the speed than the processor needed. As technology advanced the processor speed vastly outstripped the memory access speed, to such an extent that the processor had to wait many cycles for the memory to respond.

This interleaved strategy no longer produced a fast machine, so the Archimedes adopted a video demand strategy. This meant that whenever the video circuitry wanted the memory it paused the processor and took what it needed.

This tended to slow the processor down for more memory-intensive graphics modes. Also, when time-critical operations were being performed, like reading or formatting a floppy disk, the processor refused to be paused and so the screen flashed.

The answer is Vram. More correctly this is known as dual-ported ram which perhaps gives a better indication of how it works. You see, in normal ram the memory address lines are decoded with a de-multiplexer to access the one required

Upgrade costs

Second slice	*£116.33**
Ethernet card	*£116.33*
PC Card (includes DR-dos 6 and Windows 3.1)	*£292.57*
1Mb Vram	*£151.28*
2Mb Vram	*£233.83*
210Mb hard drive	*£233.83*
420Mb hard drive	*£351.33*
AKF85	*£1173.83*

Processor (ARM700, ARM800 and so on), see the Processor upgrade table

Typical ram prices (not including VAT):

4Mb	*£150*	32Mb	*£1000*
8Mb	*£300*	64Mb	*£2100*
16Mb	*£500*	128Mb	*£4200*

* Further slices available as third party upgrades.

Pricing

THE machine you'll be buying is the Risc PC 600 in three basic forms. However, buying from dealers will mean that you can specify the memory, monitor or drive upgrades you want. All prices below include VAT.

Model	Code	ram (Mb)	Vram (Mb)	Hard drive (Mb)	with monitor AKF60	with monitor AKF85	+second slice [1]	+ PC card [2]
1	ACB15	2	0	210	£1467.58	£1937.58	+£116.33	+£116.33
2	ACB25	4	1	210	£1643.82	£2113.83	+£116.33	+£116.33
3	ACB45	8	1	420	£1996.33	£2466.33	standard	+£116.33

*AKF60 monitor is 14" SVGA + XGA multiscan
*AKF85 monitor is 17" SVGA + XGA multiscan

[1] Includes the slice, longer locking pins, 103 watt power supply and longer backplane.
[2] 486SX with DR-dos 6 and Windows driver software but not Windows itself.
The card will not be available until Autumn. If you buy now you'll get a voucher.

memory cell.

In dual-ported ram there are two sets of de-multiplexers so that two different circuits can access the memory at the same time. If they both want the same memory cell then that's okay but normally they want different cells.

This allows the processor and the display circuitry to share the same memory without slowing either down. The big snag with all this, as you might guess, is that Vram is much more expensive than the normal ram. However, you only need as much Vram as the display demands.

The Risc PC has a slot to allow you to add Vram and it can contain 1Mb or 2Mb of memory, it can even be an empty socket. When it is empty you still get all the video modes you used to get on the old A5000 and the computer shares access with it as before. However, as the processor is faster there is less trouble with screen flashing.

With Vram installed, you can get a much better display and the processor is not kept waiting. With the Risc PC there are no mode numbers as such. True, the software will respond to mode numbers but you control the display by means of a Display Picker. A menu gives you a choice of all the spatial resolutions available and another gives details of all colour resolutions.

This for me is the feature that I have been waiting for on an Acorn machine since before the launch of the first Archimedes, the ability to have 8-bit colour with all 256 different display colours being assigned its own palette entry.

This allows a good quality image-processing package to be produced at last. The point is that the palette entries can be changed very easily, as there are only 256 of them, to allow real-time adjustment of an image's contrast and brightness.

However, there is more, in that there is also 24-bit colour, which means that each pixel on the screen has 8-bits defining the amount of red, green and blue. You can display as many different colours as there are pixels on the screen. This gives true photo-realistic graphics that you just have to see to believe.

This might sound even better for image processing but it is not always the case. If you want to change the brightness of a 24-bit image you have to alter the value in each individual pixels, which takes time even on a fast machine like this.

However, you can alter an image interactively in the 8-bit mode and use those parameters to process the higher resolution image.

I say the resolution is 24-bits per pixel but in fact it's really 32-bits. The extra 8-bits don't define a colour but an attribute. At the moment not all the 8-bits are used but there is room for expansion.

These attributes can be things like transparency or layer information. This is important when you have multimedia applications as the computer images can act as a mask for, say, live video, allowing much better integration of the two sources.

I did a little test with a program that renders spheres, written by John Thorpe – a colleague of mine at the University. He had written the software assuming that the colour definitions had more accuracy than the existing A5000. Did it work, would it run?

Yes, in 10 minutes which is about half the time of the A5000. Interestingly enough it ran slightly faster in the 24-bit colour modes than the 8-bit ones. I suspect this was because the operating system did not have to do any dithering and it was running in Vram.

Summing up

Well, what were my impressions of the new machine? In a word: Impressed. Users of Acorn machines can now boast that they have the most powerful computer available at its price or anywhere near it.

They now have a machine that can display graphics as well as anything on the market, with an operating system that does not gobble up the processor's power.

They also have a machine with a future, one with a carefully planned upgrade path but still with the flexib-ility to accommodate the as yet unknown developments that are bound to occur over the next few years.

You can say, yeah it's got a 486 fitted for when I want to slow things down and finally I have found a successor to my original A310. If you haven't got the cash then I would strongly recommend mortgaging your granny.

Mike Cook

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Secondary Board	£40 + VAT

Please Note: Some software not written to Acorn guidelines may not run from the new disc filing system supplied - please ask at time of order

Colour leaflets available for both of these products - please phone

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Essential education?

Will Geoff Love get 10/10 for trying?

● *You could always resort to an atlas*

THIS IS TO CERTIFY THAT
Geoff
has played the Ten out of Ten Junior Essentials games and has achieved two gold stars or more at the following:
Spelling ... En4.5
Total number of stars : 19
Date: 31 January 1994
Certificate from 10/10 Educational Systems

● *Success is rewarded*

IF ever the government were to produce a top ten list of approved software, it's certain that Junior Essentials from 10/10 Software would surely make an appearance in it somewhere, with *Back to Basics* branded proudly across the disk for all to see.

Junior Essentials is the latest in a series of educational software titles from 10/10 Software. It is aimed at 5 to 11 year olds and covers *10 essential areas of learning*. The whole ethos of the product is strongly linked to National Curriculum Statements of Attainment.

Every player has an Achievement Record. A grid shows their name at the top, 10 subjects down the side and six game titles across the top. Each game addresses six different subject areas at graded levels and it clearly shows exactly which Statements of Attainment each game claims to address.

Records of each pupil's performance are automatically stored by the computer. The cells on the grid change colour according to performance, the idea being that each pupil attempts to colour every cell green to signify a good performance. Records can be printed and certificates produced for pupils if their results merit it.

The six games are mixed in nature, a couple being loosely based on popular arcade games of yesteryear. **Defiance**, in particular, will bring a crooked smile to the face of anyone who had a misspent youth playing Defender.

If you have ever listened to Not the Real Artist on Radio One you'll have an idea of what I mean. The object here is to move around avoiding being killed, while attempting to shoot the correct answer.

The games do provide a variety of contexts in which to frame the questions, with some graphic and some textual, but at the end of the day they're still just questions and answers. One or two of them were a little misleading too.

For school use, the range of curriculum areas covered is very wide and too superficial to allow it to be planned as part of an effective progression of work.

The achievement record section of the software is certainly very comprehensive and a great emphasis is placed on this in the manual. However, being that each section has just a few questions, how much does it actually tell the teacher at the end of the day?

The final decision for a teacher will probably depend on whether you believe the child will actually *learn* anything from answering a string of questions, such as those presented by the software.

If you believe they will, and your teaching style is one geared to regular tests of knowledge and facts, then this could be a new, fun way to present them. One additional point worth noting is that the questions and answers are all stored on the disk as text files. It is therefore a fairly simple job to substitute your own questions if you wish.

The home situation is obviously different. It would allow a child to address a wide range of subjects at differing levels of difficulty – in that respect there is something for everyone. In addition, if a parent could sit alongside the child to discuss what was happening it could provide some useful stimulus for discussion.

Left to a child alone in their bedroom however, Junior Essentials could soon end up collecting dust. The gameplay is fairly minimal and the graphics only average.

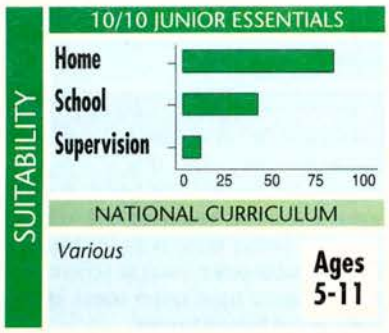
This may be seen as unfair criticism – after all this wasn't intended to be a superb arcade game – but if you dress education up as an arcade game, in children's eyes it will be compared with just that.

PRODUCT SPOTLIGHT

Product: 10/10 Junior Essentials
Price: £25.95
Supplier: 10/10 Software, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 780370

Summing up

Previous 10/10 products have focussed, in more depth, on single curriculum areas and as a result could be targeted more easily. Maybe the net has been cast a little too wide with this package.



● *Assessment is tied to the National Curriculum*

Dix sur dix s'il vous plait?

Geoff Love puts on his beret and tries to improve his French

MY schoolboy experience of French was a somewhat mixed affair. It largely consisted of worrying vocabulary tests, being chosen to translate in front of the class or picked to answer a question. Five years of hard study then left me well prepared and experienced for the final goal – worrying about the O level. Twice.

PRODUCT SPOTLIGHT

Product: 10/10 French
Price: £25.95
Supplier: 10/10 Software, 1 Percy Street, Sheffield S3 8AU.
Tel: 0742 780370

My two failures at this place me in the ideal position to answer the vital question, *Would the new French package from 10/10 Software have given me happier memories of my French lessons?*

10/10 French is aimed at the Modern Languages National Curriculum Attainment Targets three and four, and spans Key Stages three and four. This essentially means children from 11-16.

However, the manual states that it would also be suitable for children as young as eight if they were following a non-statutory language course in school or elsewhere. This seems a fair comment and I imagine they would quite enjoy working at some of the simpler activities provided.

The software comes on a single disk together with three small manuals – a Parent/Teacher guide, Player guide and a Guide de Jouer (Player guide à la Français). The software can either be run from floppy or can be installed and run from hard disk.

As with all 10/10 products, great emphasis is placed upon the system it uses to record individual user's achievement. This is similar to the Junior Essentials software also reviewed in this issue and allows comprehensive records of each user's performance to be stored on disk and/or printed.

Six different games are provided, each containing graded exercises for practising different aspects of French written language such as words, phrases and grammar. These are centered around common topics such as shopping and the family.

All games can be customised for greater flexibility, generally affecting the difficulty of the exercises, often by limiting time or making more choices of answer available to the user.

Other features can also be tailored to the child's needs. Usually, in the lower grades, all instructions are in English but as the user progresses menus appear in French. If desired, this can be altered so instructions are always in French.

The activities within the games include wordsearches, matching pictures to words, choosing the correct forms of verbs and sentence building. The games put a reasonable gloss on the activity but, while the graphics are certainly acceptable they are not stunning.

With some games, **The Cop** in particular, customising them to run at higher speeds is not recommended. If you do, the game becomes a greater test of mouse control and resistance to eye strain than a French test.

For the teacher, this package provides a wide selection of activities aimed at different levels and areas of French. To allow children to work from start to finish would not be its best use.

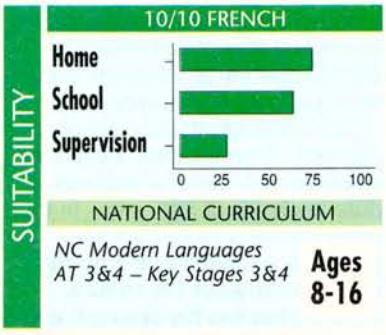
It's strength lies in setting it up to deliver one or two focused areas of the curriculum that complement and support the teaching that is currently taking place in the classroom. In this way, the use of the package could be an on-going resource used over an extended period of time.

In the home the situation is not quite so clear cut. The average child could not *learn* French from this package as it is really designed to *support* a taught French course.

Therefore, it may be harder for children or parents to know which sections are applicable to them at any one time. On the other hand, if a child looks at the screen and can't recognise a single word on it they probably wouldn't attempt it anyway.

● *Testing fluency of action as well as speech*

● *The French are renowned for their food*



Summing up

Planned selectively, this is a useful resource for schools and handy for the home if, like me, you need to brush up on a few (very) rusty skills. If this had been available when I was at school perhaps it would have taken some of the worry out of French lessons.

... 32-bit Acorn home computers ..... Commodore Amiga ..... IBM PC /compatibles ...

The *10 out of 10* Series

Rapidly becoming Britain's favourite choice in educational software

Try it FREE!

Maths (Algebra)

For children 6 to 16 years

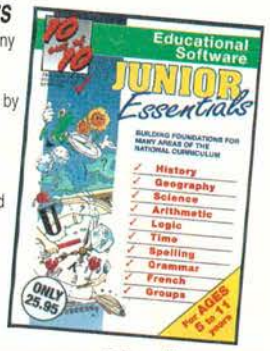
THE BEST EDUCATIONAL GAME of 1993

"*10 out of 10* Maths (Algebra) meets all the criteria for an outstanding educational program and fully deserves first place as the Edutainment Program of the year. Ten out of Ten for it!"
– *Amiga User International (January '94)*

"This pack is very good. It is well suited to both home and school use. It encourages good skills, like searching for patterns and estimating. Also it's available on approval, so what are you waiting for?"
– *Acorn Computing (December '93)*

Junior Essentials

For children 5 to 11 years



A truly flexible package covering many topics essential for building a good educational foundation. The areas covered have been carefully chosen by a team of experts and come from several subjects and levels of the National Curriculum.
The child's progress in these areas is constantly monitored and recorded and parents or teachers can easily discover where a child needs help. As with all the *10 out of 10* series, further motivation to play the games and learn more is added in the form of High Score Tables.

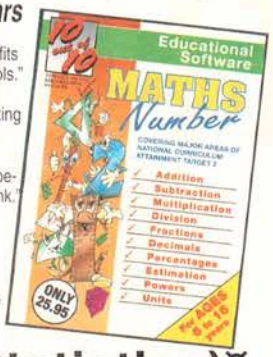
Dinosaurs

For all ages

This package is the fun way to learn the facts about dinosaurs. The six games all have superb digitised graphics to make a whole area of history – dinosaurs – come alive.
If you came face to face with a tyrannosaurus would you run away? Or are you safe because it's a vegetarian and wouldn't eat you? This, together with 100s of other interesting facts, can be discovered from this enthralling package.
The six games – all with single and multi-player options – are educational fun for everyone.

Maths (Number)

For children 6 to 16 years



"Well thought out to offer real benefits to children studying in British schools."
– *PC Plus (July '93)*

"Educationally worthwhile and exciting to play – a rare combination."
– *Archimedes World (December '92).*

"Unique in home-based programs because of the National Curriculum link."
– *The Micro User (September '92)*

"Excellent for reinforcing specific mathematics knowledge."
– *Junior Education (July '93)*

"The *10 out of 10* Series lives up to its name." – *PC Home (August '93)*

Early Essentials

For children under 7 years

"Outstanding. All of the activities are not only very enjoyable but they're well thought through. It's one of the best multi-purpose infant packages I've seen in a long while. If you have young kids get it for the home. If you're a teacher, hammer on the headteacher's door and beg for money to buy a copy."
– *Archimedes World (July '93)*

"At just £25.95 you'll be hard pressed to find anything which even comes close to Early Essentials."
– *Micro Computer Mart (Sept. '93)*

English

For children 6 to 16 years

"Everything being done is relevant to the player's education. An invaluable curriculum experience, plenty of fun, lots of variety."
– *PC Home (November '93)*

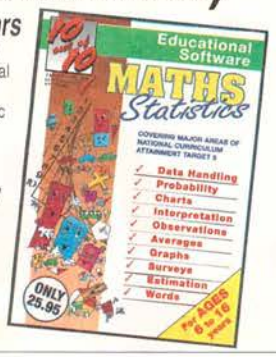
"Guaranteed to sustain the attention of even reluctant learners."
– *RISC User (January/February '93)*

"Most importantly, as the games are fun, children can't help but learn."
– *Acorn Computing (March '93)*

"Allows progression from Junior school age right up to GCSE level."
– *Amiga User International (Sept. '93)*

Maths (Statistics)¤

For children 6 to 16 years



Attainment Target 5 of the National Curriculum is Data Handling – a vital area of Mathematics. *10 out of 10* Maths (Statistics) covers 36 specific topics from that subject.
In this package, recording animal sightings in an animated pond or rolling dice are just two of the many challenges that children will relish as they learn about statistics. And can graph drawing be a game? It becomes arcade action as bricks and bombs are dropped onto the charts. This is a really enjoyable way to learn about statistics.

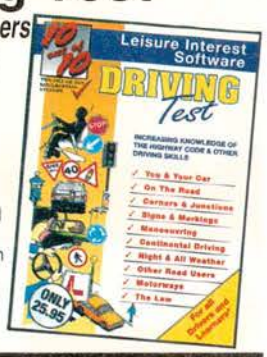
French¤

For children 6 to 16 years

This suite of six educational games will give fun and motivation to all children learning French. The package is designed with the Modern Languages National Curriculum firmly in mind and contains many challenges to reinforce facts stated in Attainment Targets 3 and 4.
10 out of 10 French is essential for children on Key stages 3 and 4, but the numerous parent and teacher customisation options make the software suitable for all children – however young – who are learning the French language.

Driving Test¤

For all drivers and learners



Whether you're a novice learner or an advanced expert, there's plenty you can learn from this package. There are thousands of built-in questions and you can choose whether you want to answer them directly or add to the fun by trying them within games.
The six games have been designed to be fun for all adults and include strategy, mental agility, coordination and more. And, if you think you are up to it, you can "*take the test*" – a challenge covering many areas of the Driving Test.

The INNOVATIVE *10 out of 10* Series

These highly acclaimed suites of programs are a revolutionary step forward in educational software. They ALL use a unique system of automatically recording children's progress as they play and learn. This is just one of the many features which sets the 10 out of 10 Series in a class of its own.

Already used in over 6000 schools

Each package contains **SIX** expertly designed educational games **covering TEN essential areas** of a child's education. All packages cover a **wide age range** and subjects are available for all children from three to sixteen years of age.
As children learn from the games their progress is **automatically recorded in 36 specific challenges** – the National Curriculum Attainment Targets of these areas are optionally displayed on screen in subject-based packages. All the programs are **designed in Britain** to be **fun for single players or groups** and the assessment system can monitor the progress of up to 4000 children with **no input from parent or teacher** needed. Watch them, join in the fun or leave them and return later to check their progress. **You're in control!**

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The 10 out of 10 Series is available for Acorn 32-bit computers (Archimedes), Commodore Amiga and IBM/PC and compatibles. At the time of going to press, titles marked ¤ were not available on all formats. Please ring for availability. Each package is ONLY £25.95 and you can order by CREDIT CARD, CHEQUE or EDUCATION AUTHORITY ORDER.

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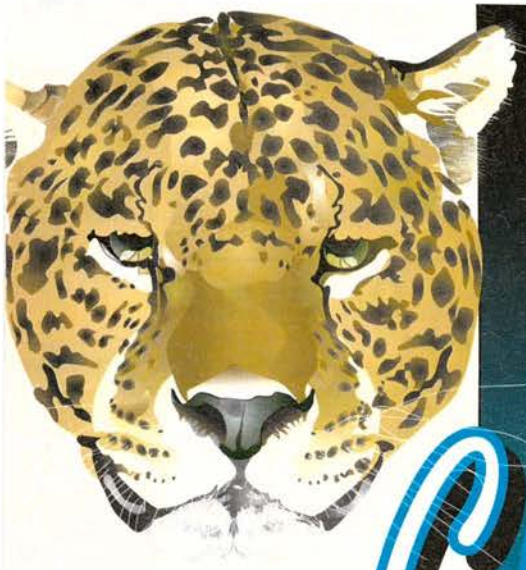
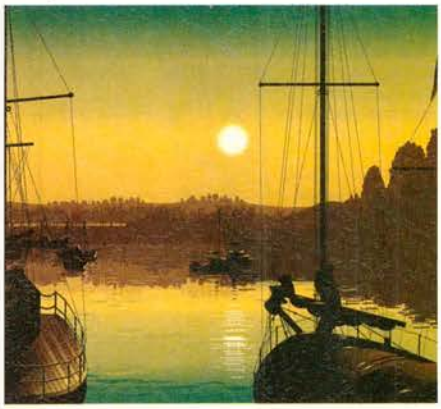


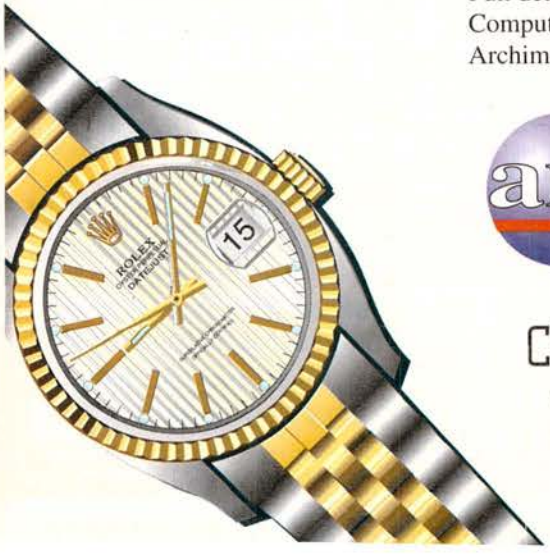
1994 ClipArt Competition

WIN the latest Acorn **Risc PC**



Computer Concepts and Archimedes World are proud to jointly announce the launch of *the* 1994 clip-art competition - a competition open to anyone wishing to enter, submitting artwork (not sprites) produced in any graphics/drawing program available for Acorn RISC computers. The fantastic first prize is a new Acorn Risc PC, and there is a special Best ArtWorks Entry prize and a string of runners-up prizes - all details to be announced in the May edition of Archimedes World. So hurry and get those creative fingers moving ... you have until 31st July 1994.

Full details and an entry form are available from Computer Concepts and are also published in Archimedes World.



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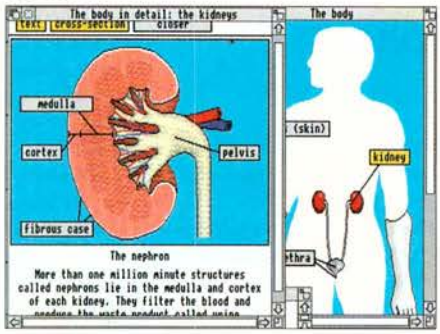
The wrist bone's connected to...

Chris Drage assesses a program which explores the human body

BODYWISE is an engaging exploration of the human body for upper Key Stage 2 pupils and is, in essence, an interactive animated database. The package comprises three disks, six double-sided study sheets, two graded sets of search cards, a labelled skeleton, a poster and an ideas book.

Bodywise is fully RISC OS compliant and, in common with Sherston's software, is started via a key disk and is highly protected in order for their popular approval scheme to operate.

Once the icon is loaded on the iconbar, clicking on it opens two windows; a blank human form in one and eight body systems in the other.



These eight systems include nervous, musculo-skeletal, blood and nymph, respiratory, digestive, excretory, endocrine and reproductive systems – the latter system being password protected for privileged access.

Selecting any of these systems superimposes it on the body form and labels can be called up which provide pathways to information, close-up views, cross-sectional views and animations.

The set up page provides teachers with the opportunity to select the systems they want the children to explore in the main program, or to select the alternative *Placing the parts* option and set the level of difficulty of the text and labels.

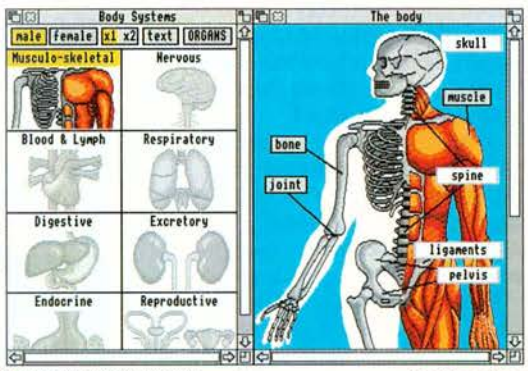
The *Placing the parts* option calls up a secondary part of the program in which children must pick up various organs and try to place them as accurately a possible on a body shape.

When complete, a correct version is displayed and each placed organ is marked out of ten, with a final correct percentage being displayed – not as easy as it first seems. This is a useful section which presents a real challenge to children and adults alike.

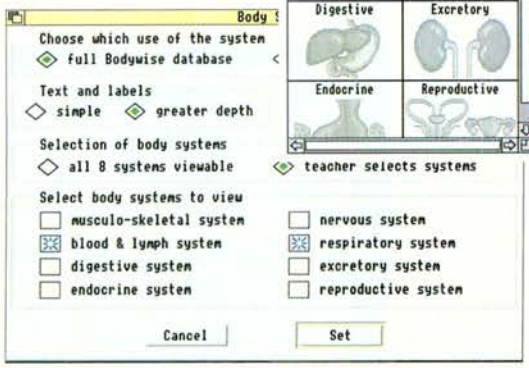
Bodywise has been designed so that all the illustrations and text can be saved easily or transferred to other applications – a philosophy Acorn is very keen to promote. Illustrations can be printed or saved with or without their labels, either in colour or as simple black line outlines, while text can be dropped into any word processor as a text file.

This makes the program extremely useful to use as a resource to accompany any topic related to the human body. The ideas book provides some useful ways in which children can use their printouts.

One that I like suggests the children print out each system in turn, drawing clothes on the top (blank) copy, cutting them out and stapling them together to make their own peel-away, body book.



● *There's a choice of six body systems*



● *Parent or teacher can exert their control*

Other resources included provide additional information to extend the material covered by the program and quiz cards to direct specific searches of the database. On the down side, the animations tend to be rather slow and jerky, lacking smoothness.

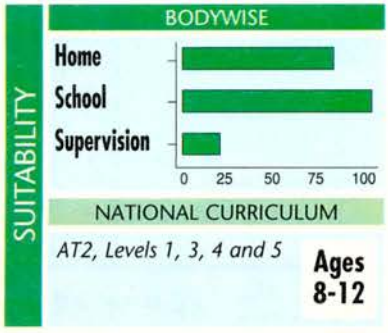
PRODUCT SPOTLIGHT

Product: Bodywise
Price: £39.95
Supplier: Sherston Software, Swan Barton, Malmesbury, Wiltshire SN16 0LH.
Tel: 0666 840433

Summing up

Apart from its obvious applications in schools, Bodywise is one of those programs I like to have at home, rather like an encyclopedia. When a friend of the family was recently admitted to hospital with kidney problems, Bodywise proved a most useful reference to answer my children's questions as to the nature of kidneys and their function.

Although Bodywise cannot hope to compete with the likes of Anglia TV's impressive Understanding the Human Body CD-Rom, it is, nevertheless, a most useful and well-designed program which will prove invaluable for teachers of Years 5/6. It is quite compulsive to boot and positively encourages children to explore for themselves.



Tricky bits

Frank Jukes puts Minerva's brain teaser through its paces

IF you enjoyed Repton (remember him?) or more recently Lemmings, you may well enjoy PrimeSolver from Minerva. Using PrimeSolver, problems can be devised and then presented for solution by others. By choosing from nearly 60 tools or gadgets, screens can be built to range from the very simple to what can politely be described as taxing.

PRODUCT SPOTLIGHT

Product: PrimeSolver
Price: £79.95
Supplier: Minerva Software, Minerva House, Baring Crescent, Exeter, Devon EX1 1TL.
Tel: 0392 437756

Gadgets include balls that bounce, fans that fan, vacuums that suck and frogs that hop. Ramps, water, electric leads, steam engines, chain systems, lights, radios and Mike the Bike extend the list and provide the problem designer with the wherewithal to create real headaches.

Looking at the program for the first time I must admit I found it difficult to grasp what it was all about. The manual soon solved that problem and by following the tutorial I was hooked, taking me through a carefully graded series of tasks and providing some reasonably subtle hints on their solution.

The very first requires a floor and water to be added to a swimming pool to enable Felicity Green the frog to go for a swim.

Alongside the action window is the Gadgetbox containing a limited store of tools with which to devise a solution to the problem. In this instance there is one section of floor and another of water. By dragging them into position with Select, and then stretching them to fit with Adjust, Felicity's needs can be met.

Later problems in the tutorial demonstrate how Mike the Bike on his exercise bike can be turned on by nothing more exotic than a light, a radio or a hit from a soft object.

Pedalling relentlessly, he can generate power for various electrical appliances or move objects attached to a pulley system. A hit from a hard object, though, will stun him, so take care.

The change from solving ready-made problems to creating original ones takes a little more time and effort, but it is equally rewarding. By using the Experiment Mode it is possible to learn how the various tools should be placed for best effect and how they interact.

With an unlimited number of Gadgets and with the existing problems from the Problems List, it is easy to try constructing alternative solutions or even to completely alter a problem.

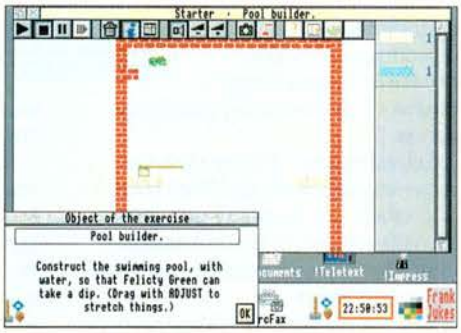
Moving to the Design Mode is the next step. I found it difficult at first to visualise the whole of a problem. It was easier to create one in sections and then try to marry them together.

Quite often things wouldn't link or, when they did, there were unexpected consequences. Balls, for example, would roll further than I had expected and would activate Gadgets which should have waited for a later prompt. It was all part of the learning process and, although frustrating at times, it was nevertheless good fun. Honest.

PrimeSolver works on several levels. Simple to use when solving problems, it is complex and powerful when problems are being set. This demands a manual to match and Minerva have done well.

Their 80 page A5 booklet provides a lot of helpful information including good descriptions of all of the Gadgets available. The section on Design Mode covers the process well but left the explanation on how to set up *Goals*, which tell PrimeSolver when a task had been finished, a little unclear.

It was only when I had finished reviewing PrimeSolver that I discovered how much it cost and I must admit that I felt very disappointed.

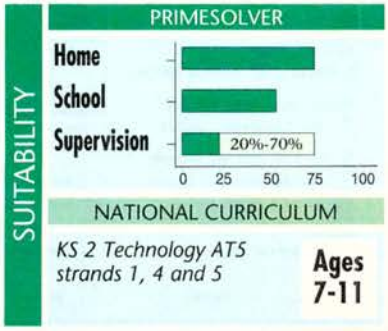

Starter · Pool Builder.
Object of the exercise
Pool builder.
Construct the swimming pool, with water, so that Felicity Green can take a dip. (Drag with ADJUST to stretch things.)
OK
22:50:53
Frank Jukes

● *The program offers help and suggestions*

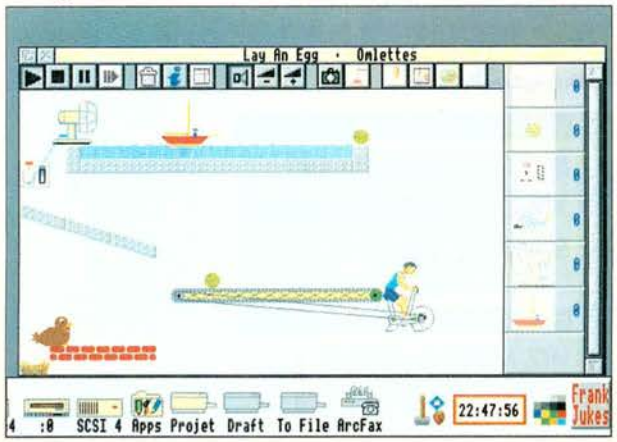
It is obvious that Minerva must have put a lot of time and effort into developing the program but I have got to say that I have serious doubts about whether schools or home users will be willing to spend that amount on it.

Summing up

I really enjoyed both setting and solving problems with PrimeSolver. As well as being fun it also has potential as a tool for developing logical and organised approaches to problem solving. Recommended – but it is expensive.



● *You'll need an omelette after solving this one*



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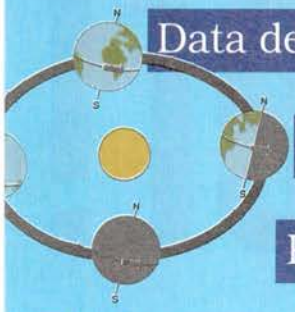

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Pin pusher!

Mike Goldberg pokes around in animated relief

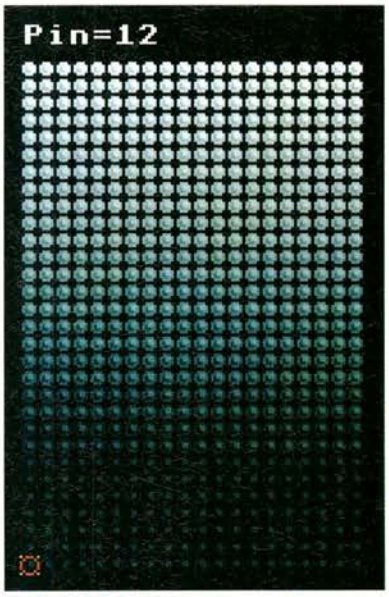
YOU must have seen one. One of those executive toy things with all those shiny metal pins that you can push in, forming a relief pattern of whatever object you've forced into it – usually your hand in a meaningful gesture.

You may have seen a monster version of one used in the opening credits of Inspector Wexford or lately in a ZZ Top video. I have an A5-size pinboard with a permanently rendered gesticulating hand, which prompted me to take a closer look at how these things work and to create a computer version.

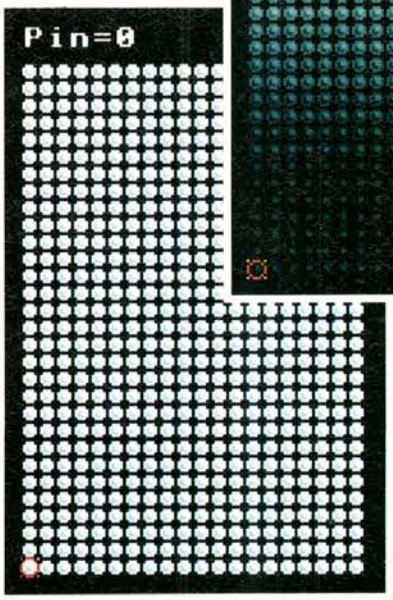
Firstly, I noticed that the round headed pins are arranged in a honeycomb pattern to cram in as many as possible for improved definition – so I ignored that and arranged mine in parallel rows and columns.

This sacrificed detail for ease of programming. I'm all for making life as simple as possible when programming, otherwise I would be 140 years-old by the time I'd finished this one.

Anyway, my computer-created pinboard is only 20 pins wide by 30 tall, but that's 600 pins and plenty to form discernible pictures – if you squint your eyes and stand 200 feet away from the monitor and have a vivid imagination.



● *The pins, ranging from dark to light*



● *A nice fresh pinboard awaits*

That, however, is not all. What I wanted to do was similar to those Wexford credits – that is, the pins moving to form a picture as if the object were actually being pushed in, in real time, thus creating an animated sequence.

There were two ways I could approach this, either by learning ARM assembly in two weeks flat, thus affording me the speed to move 600 pins seamlessly, or cheating and grabbing each altered image off screen and saving them as sprites which could be played back just as smoothly. No contest.

Who wants to learn another assembly language, the electronic equivalent of painting the Forth bridge? By the time I'd cracked the 6502 on the Beeb the Archimedes series was busy knocking vast chunks out of processing speed, rendering my gallant efforts somewhat obsolete.

I guarantee that the speed of Basic on the next generation will leave nothing wanting or I'll eat my hat – the big fluffy one with a pompom.

Where was I? Oh yes, the actual program. The program starts off with a reminder that before you run *Pins* you must allocate at least 288k for the system sprites. Okay, it's not really kosher programming practice but it's *easy*. Now just press Return and off you go.

On the left of the screen is the pinboard with all the pins fully out – all nice, bright and shiny (well it's new you see!). The red circle in the bottom left corner is the cursor which you move around the board using the following keys:

Z	Left	X	Right
"	Up	?	Down

or you can use the arrow keys. To push the pins in press Return and use Space to pull them out.

As the pins go *down* they gradually darken. The value of each pin is indicated above the pinboard where it says *Pin=*. The values range from 0 which is the brightest pin to 12 which is the darkest.

In practice I found that if I wanted a row of pins all of value 8 it took ages pressing Return for each one, so instead you can use the number keys to force a pin to be a particular value.

Note that I have used the ~ key for 0, then 1, 2, 3...8, 9. The keys for 10, 11, 12 are 0, – and + respectively. For real speed use your right hand on the cursor keys, hover with your left over the number keys and play the piano with your feet.

You can copy rectangular areas too. Press Copy and the cursor turns blue with the word *Copy* appearing in the bottom left corner. You are now ready to set up two points that enclose the rectangular area you wish to copy.

Press Return at the first point, move the cursor to your next point

and press Return again. The cursor will now be a red rectangle the size of your defined area. Now move that around and press Return where you want the copy of the object to be.

To exit from Copy mode press Delete and the cursor reverts to being its happy and red circular little self.

If the thing you are drawing looks terrible and you've made a hash of it press the # (hash) key on the numeric keypad and this will restart the whole program (ouch). If you like what you see you can save the image to disk – press S to save and you will be prompted with what to do.

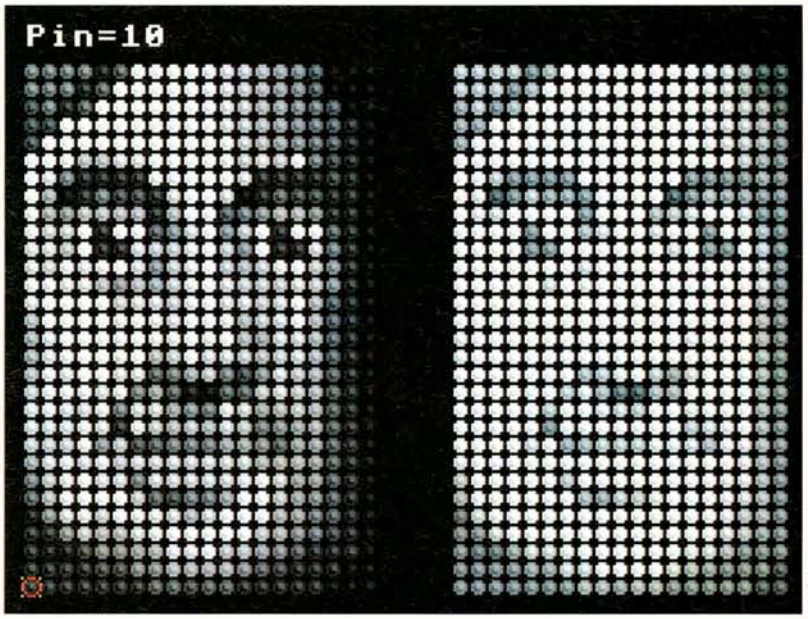
Loading in an image is just as easy – press L, follow the prompts and you can edit an image you made earlier. I had the Ed fiddle with the program so that it loads and saves into the same directory as the program – as long as you double-click on *!MAGsdir* first – why be the monkey when you can grind organs?

Also at this stage you are ready for the fun bit. That's right, switch off the computer and go to the pub ... no, what I meant was you can now animate your pins.

Make sure you save your image first otherwise you'll lose it, so press S and save it with a meaningful name. Now press R to Record the images. Watch the screen as the pins are all gradually turned from dark to light, that is each pin value is decreased by one until all the pins equal zero.

You can see how slow it all is as the the program grabs 13 sprite images. That is why I ended up using saved sprites. The reason I have used system sprites is another story.

Although much maligned, the System sprites came to my rescue as I got nowhere trying to allocate the correct memory space for user sprites. The four tomes of the RISC OS Programmers Reference Manual was its usual helpful self and is now seeking promotion from doorstop to occasional table.



● *At last we meet face to face, Mr Bond*

After the wait (it's finished when the cursor reappears) you can press A to animate the frames. *Oooh, come and have a look at this Mabel.* Well, I found it quite fun to watch the image evolve from nothing.

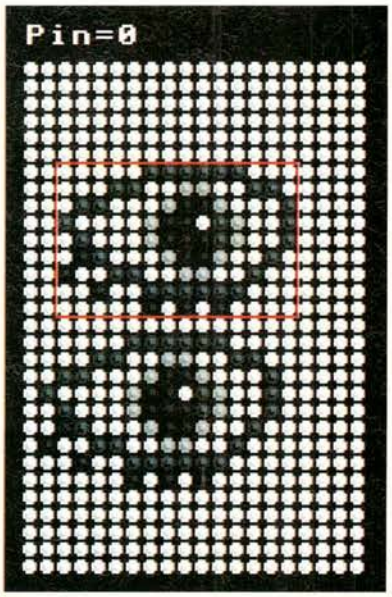
Press Q and watch it dissolve back to nothing. Keep alternating between A and Q and get your money's worth. Fascinating stuff – keeps the cat amused anyway.

Now it's just a matter of creating your own wonderful images. A couple of helpful bits now. When moving the cursor around using the Z, X, ", ? keys put your right thumb on the ALT key to speed up the movement.

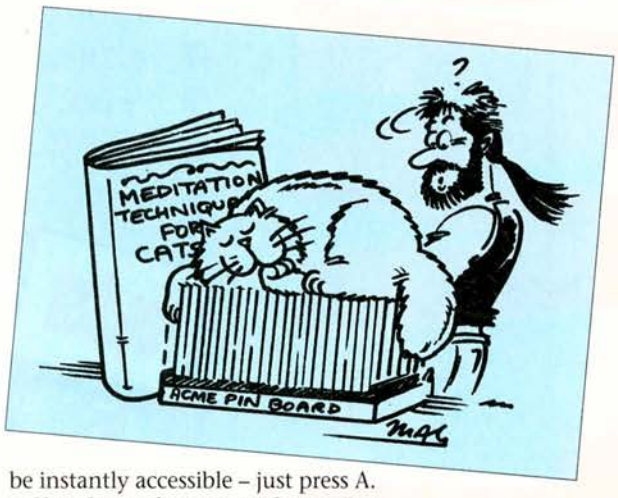
Similarly, if you use the arrow keys put your right thumb on the CONTROL key. You can also save and load the complete animation sequence of sprites. When you have recorded the image you want to animate, by pressing R and letting the program grab all the sprites, just exit the program and save the sprites as a file thus:

```
*SSAVE MyAceFilm
```

To load back in any time type *SLOAD MyAceFilm and then run the *Pins* program. The animation will be instantly accessible – just press A.



● *Copying an eye for an eye*



You do not have to stick to using pins to define your picture. If you have a look in the sprite file *Pinsfile* you will see 13 more sprites called *square* plus a number 0 to 12. To use these squares in the *Pins* program instead of pins, alter line 1400 in DEFPROCsetSprites:

```
1400 PROCsetSprite("PIN"+STR$I%...
                    |
alter "PIN" to "SQUARE"
```

Better still, why not create 13 sprites of your own all with the same name and incrementing numbers – you could get quite unexpected results.

Back in the Feb 94 issue I requested your help about grabbing sprites off screen and saving them to one file each with a different name.

Well, thanks must go to Graham Savage of Oldham and John Houston of Orpington for providing me with the System sprites solution, without which I could not have done this program. They each receive a cartoon by yours truly.

NEXT MONTH

DTP

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In the next issue of Acorn Computing we'll reveal the new publishing package from Computer Concepts – can it really stand up in the professional world?

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I got rhythm, I got music...

James Coates assesses a new music package from ESP

IT IS with a degree of apprehension that I greet products with the word *Rhythm* in the title, mainly because I've had bad experiences in the past with similarly named products which have tried to replace what has become accepted as the norm for computer music.

They have generally taken the form of a bad attempt at cloning the age-old Tracker genre. Thankfully, Rhythm Maker from Expressive Software Projects is exactly as its name suggests: A rhythm maker, and very good at its job it is too.

Rhythm Maker is a well-presented application which seems quite at home in the classroom, although I felt it was slightly uncomfortable in the home user environment. Basically, it is a simple grid-based drum pattern creator and editor but with refined controls.

If you're looking for a piece of software to replace Tracker or one of its counterparts, then perhaps you should stop reading now, or at least get the idea out of your mind – this application is not suited for creating music.

At its simplest, Rhythm Maker could be used for providing a strict metronome beat to accompany a classroom performance, although, speaking from experience, an atomic bomb detonating on every down beat wouldn't keep your average group of 10 year old recorder players together.

At its best, it can be used to create incredibly complex and embellished drum patterns, which, with suitable equipment and some fine tuning, could easily find itself on vinyl. After all, it's not uncommon for the Amiga to end up in the charts, so why not the Archimedes or Risc PC?

I found Rhythm Maker particularly easy to get to grips with. It's a simple *point and click* affair, and you can edit the patterns as they play, which is very useful for getting sounds exactly where you want them.

For those of you familiar with the Tracker genre, you will understand patterns and events. A pattern can be thought of as a bar in a piece of music. On each beat of each bar, there is an event. As with standard musical notation, a bar can have any number of beats in it, and Rhythm Maker supports this.

Those of you daunted by tadpoles and telephone wires – I never worked out what tadpoles had in common with BT – should have no problem here, and, as I see the program as being primarily an educational package, children should be able to get into it straight away.

I did find it annoying that existing samples such as those used in Tracker or Armadeus could not be used – relocatable modules are what's wanted, which means that you are, in theory, limited to the sounds that come with the package.

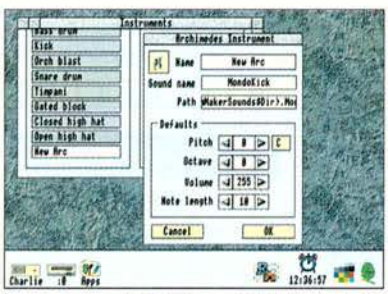
Rhythm Maker also seems to have a particular quirk, in that if you try to alter the filename of a sample it complains profusely. Similarly, after saving my masterpiece it proved difficult to load it in again at the beginning of a new session, unless samples were loaded by hand before starting.

The manual was not particularly helpful here, although it was generally easy to understand and certainly more helpful than others that I've seen. Everything is laid out in clear sections, and the step-by-step guide was comprehensive and covered everything you'd need to know to get going quickly.

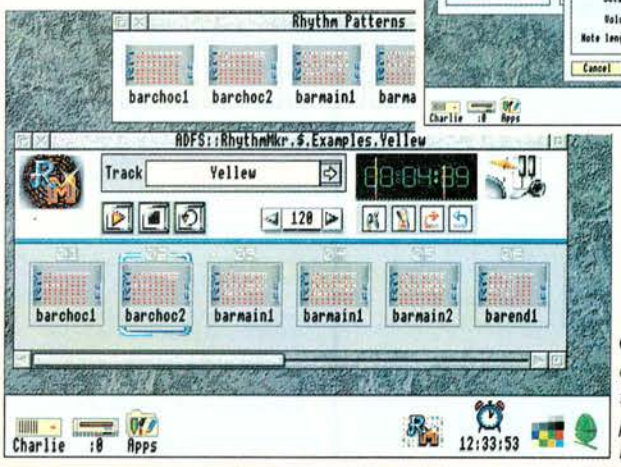
One thing I particularly liked was the fact that everything covered in the manual had a picture of what should be happening on screen – excellent.

PRODUCT SPOTLIGHT

Product: Rhythm Maker
Price: £34
Supplier: ESP, Holly Tree Cottage, Main Street, Strelley Village, Nottingham NG8 6PD.
Tel: 0602 295019



● *You can add or edit your own instruments at any time*



● *Change the order and edit the rhythm patterns simply by dragging*

Summing up

Rhythm Maker is a package which will prove invaluable in the classroom for exploring rhythm in a colourful and fun way, although to be truthful, I cannot really see its value in the home environment. The manual is well laid out, and actually quite fun to read.

I'd recommend it for use with Key Stage 2, Attainment Target 1, in Music in the Notional Catastrophe and in particular will *Devise and develop musical ideas within simple structures and Communicate musical ideas to others and record compositions through the use of notations.*

The thing that Rhythm Maker really has going for it is that, unlike the live equivalent, it doesn't need half an hour to warm up and then doesn't complain when you won't let it take a break.

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A view with some room

Mike Cook takes a close look at some stellar bodies

PDS VIEW from Spacetech is a general purpose image processing package with a bias towards the Planetary Data System – hence its name – from NASA.

The Planetary Data System is a format for releasing data from various NASA space probes onto CD-Roms. PDS View was reviewed in the June 1992 issue of *Acorn Computing* but there have been sufficient improvements in the latest version 1.15 to warrant another look.

The first thing to note is that the manual has been completely re-written and re-laid, in a 160 page A5 ring binder. As well as contents and index there are summary and help sheets conveniently tucked into the binders cover.

This is far more comprehensive and informative than the previous edition, concentrating not only on what the application does but why you should bother to do it. There are three introductory exercises taking you through the fundamentals and, unlike many introductory exercises, actually produce some interesting results.

One of the big improvements over the previous version is the way PDS View handles a wide variety of file formats. One problem with the non-Risc PC range of Acorn machines – as far as image processing is concerned – is the poor control over the displayed colours.

In the jargon each colour can only be described in four bits or a 12-bit palette with 8-bits per pixel. Ideally you want a 24-bit palette and 24-bits per pixel.

Fortunately, PDS View can handle this sort of format through the Clear file format. This is the one that is native to PDS View and serves as an ideal linking platform for all sorts of other image formats.

Even though your computer can't display that sort of colour resolution at the moment, it can with Acorn Risc PC machines or a graphics enhancement card. The RISC OS 3 sprite file format can handle 24-bit palettes.

The art of image processing consists of adjusting an image's brightness and contrast, as well as performing filtering operations; PDS View performs these very well.

However, another job of image processing is the stitching together of two or more images taken in separate bands and producing a colour picture. It's rather like using a black and white film with three shots of the same subject through red, green and blue filters and then combining them to produce a colour picture.

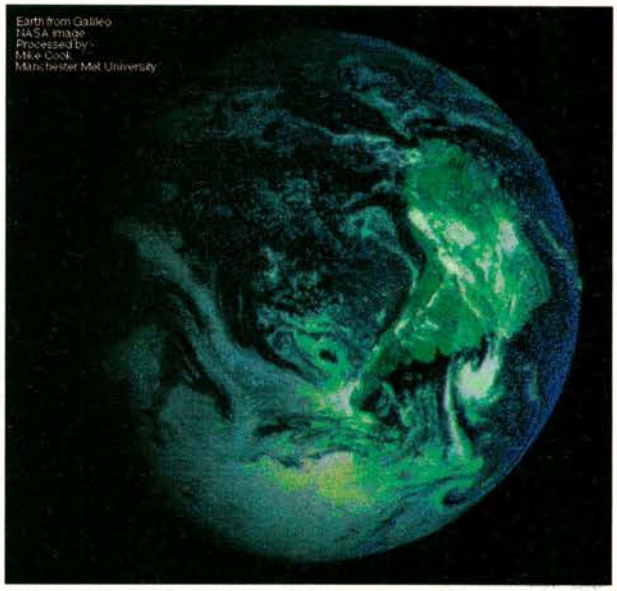
With spacecraft pictures the images are often taken through filters outside the visible wave bands, like infra-red and ultra-violet. PDS View has quite a good user interface to allow you to do this easily and control the final results.

I used the images of Earth, taken by the Galileo space craft en route to Jupiter to construct a composite colour image. Note here that I used one of the far infra-red bands as the visible red component of the image. This makes the land look greener than it would do, but overall is quite pleasing.

There is a lot more to PDS View than can be justified in a small review. However, one of its more powerful features are command scripts. These are text files describing a series of operations used to directly drive PDS View. This allows you to build up your own macro operations, taking the drudgery out of multiple operations.

For example, suppose you wanted to make a lot of composite images like that of Earth. Each image has to be loaded, have telemetry data cropped from it, made negative, flipped from left to right and have its contrast adjusted.

This is because you are dealing with raw data from the spacecraft. All this is much quicker with a macro. It also ensures that you always crop the same area.



● *Looking back to the home planet*

PRODUCT SPOTLIGHT

Product: PDS View
Supplier: Spacetech, 21 West Wools, Portland, Dorset DT5 2EA .
Tel: 0305 822753
Recommended: 4Mb ram, hard drive, RISC OS 3, CD-Rom

File formats handled by PDS View

File	Type
Sprite &FF9	Common currency on all Archimedes machines
Clear &690	24-bit palette and 24-bits per pixel
JPEG &C85	Compressed 24-bit pixel data, lossy *(gets rid of unnecessary information)* but good
Data &FFD	Can be configured to load a number of foreign formats
WX_Task &C21	From Spacetech's Weather Desk system
CSV &DFE	Histogram/plot data
Text &FFE	Command/configure files

Summing Up

Image processing is a fascinating and exciting aspect of computing, there is a wealth of data from satellites just waiting to be viewed. In the medical field, image processing is at the forefront of the latest techniques.

If you have any interest in image processing at all on Acorn computers, then this is without doubt the best package I have seen. Chock full of features, I find it hard to beat.

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Of cookies and doughnuts

Paul Whitehead looks at the production process and problems of the 3.5in disks

TO THE surprise of everyone, about a year ago there was a shortage of 3.5in disks. This was due to a variety of reasons, one being that from the norm of churning out millions of 5.25in disks for years, the situation turned. Today the 3.5in disk accounts for more than 80 percent of the market.

The situation was never that serious in the Acorn market due to one of the *features* of the newer Acorn machines – the ability to format and read high density disks from low density ones. Most disk manufacturers would throw up there hands in horror at this and in fact data does deteriorate faster, but at least you have the choice.

Disk specifications vary from manufacturer to manufacturer. Although all disks look the same the similarity ends there. There are different techniques and each want to add their own performance and quality characteristics.

In production

The *cookie* is a round piece of plastic coated in something that will store magnetic information, but the basic cookie is useless as a data storage medium without a number of manufacturing processes.

First the cookies have to be smoothed down and some companies achieve this by individually polishing each one, while others use a linear technique which burnishes an entire coated web of cookie material with a series of high speed cutters. The web is then routed through a series of *wiping stations* to clean off the debris.

The next stage is called certification, which is the manufacturer's guarantee that the disks meet the minimum standards laid down by ANSI, the American National Standards Institute.

The ANSI clip level – a signal-to-noise ratio which is also known as the signal response, ensuring the disk can be written to and read without too much difficulty – is 40 per cent. Most companies exceed this using a clip level of up to 75 per cent, which means that even faint signals can be read. This is especially useful if the head of one machine is slightly out of alignment when trying to read a disk from another computer, whose head might also have been out of alignment when writing the data.

It is interesting that even if you never use disks from another machine, your heads might drift out of alignment, making disks written earlier difficult to read.

Errors and guarantees

Beware of claims from manufacturers of *100 per cent error free*. Not all of the disk surface has been checked for faults as manufacturers test the track areas only and there might still be faults between the tracks.

This type of defect can be subtle but will grow and eventually destroy all the data on the disk. A defect can start life as a tiny gap in the surface, but as this is used the read/write head in the drive will gradually make it bigger until it covers the whole track. The disks can then crash making it unreadable and unwriteable and completely tying up your data.

Another no-no is *Lifetime warranty*. If a manufacturer is truly honest with himself he'd realise that a warranty for a disk carrying valuable data is almost meaningless. The disk can be replaced at a very low cost, but can the data?

This argument at least demonstrates the value of keeping more than one copy of a piece of work. Valuable data on hard disks should be backed up on at least two disks, with copies being kept in separate places in case of fire or theft. The same precaution applies to original data written to a floppy disk.

Dressing

Once the testing process is complete your disk might find it's way to the Automatic Disk Assembly Plant (ADAM) where they are inserted into their *jackets*.

ADAM is a new process of manufacturing jackets which bonds rolls of PVC and linear material. The output is a continuous roll of jackets ready to be filled with disks.

This is a more sterile environment eliminating defects association with interference from detritus – dust and stray fibres – more common in the older processes. Another benefit is the more consistent torque or force necessary to turn the disk in the jacket.

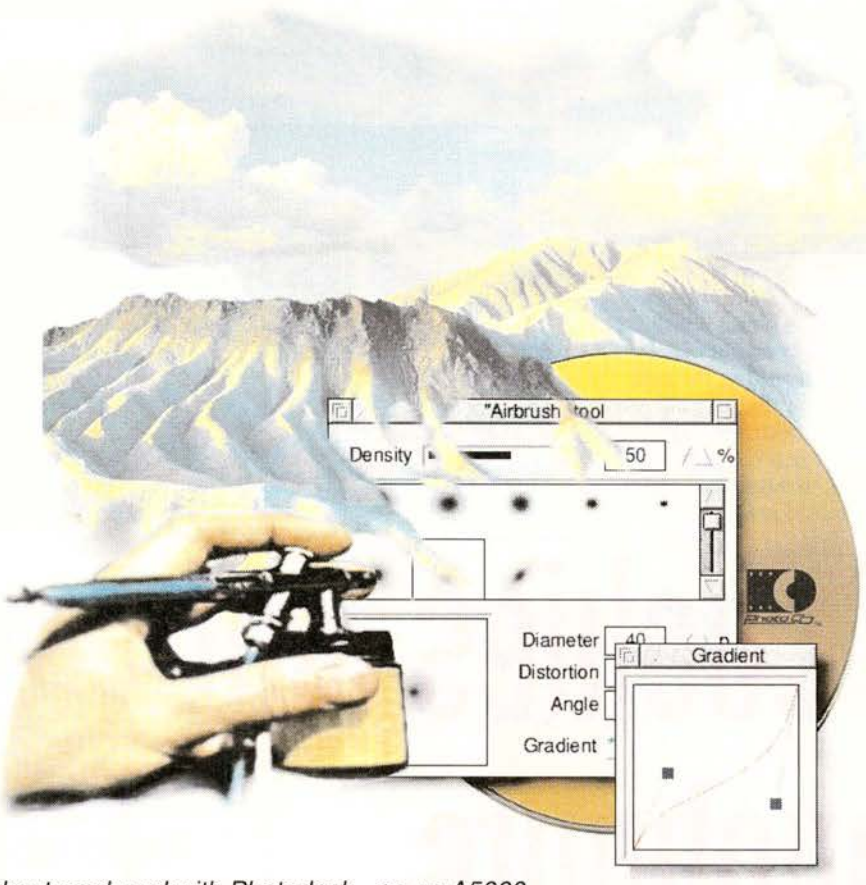
Leaving the plant the disks are degaussed or demagnetised to ensure that all traces of testing are removed and that the disks are clear of any stray magnetic influence.

Our thanks to Dysan Magnetics (0734 868010) for the information used in this article.

Price or quality

In a typical business environment the cost of filling a disk with data is more than 100 times the cost of the original disk. But should you go for quality or quantity? At the end of the day you pay your money and take the risk.

However, perhaps you should select low-priced disks for low-value data and high-end disks for valued and valuable information.



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Smile for the birdie

Rob Miller follows up the theory of PhotoCD with a look at the realities

BACK in the August '93 issue of *Acorn Computing*, I talked about the new innovation of PhotoCD. Since then, Acorn have been busy developing their own software to allow Acorn RISC computer systems to access PhotoCDs and manipulate the images stored on them.

In order to maintain complete compatibility with the PhotoCD standard, Acorn have signed a deal with Kodak and ported existing code written in C over to their 32-bit machines. The majority of these routines are designed for third-party software developers and have been included in a special PhotoCD developer's toolkit.

Acorn have produced their own version of Kodak's PhotoAccess application, as an example of what can be achieved. This is a small program that allows PhotoCDs to be catalogued and pictures to be extracted from it.

The Acorn application – PhotoView – is functionally identical to PhotoAccess and provides similar features to those found in the PC and Apple Mac versions of the software.

PhotoView is designed to run on any computer running RISC OS 3. A PhotoCD-compatible CD-Rom drive and CDFS 2.20 are also required.

Looking at resources

At its simplest level, PhotoView can be regarded as a quick and simple means of cataloguing PhotoCDs. A PhotoCD can be catalogued in the same way as any other type of CD-Rom but you only get a list of filenames.

Specific Kodak guidelines means that each picture on the PhotoCD is labelled as IMG followed by a number – such as IMG0001 – so it's impossible to tell what a picture is just from its filename.

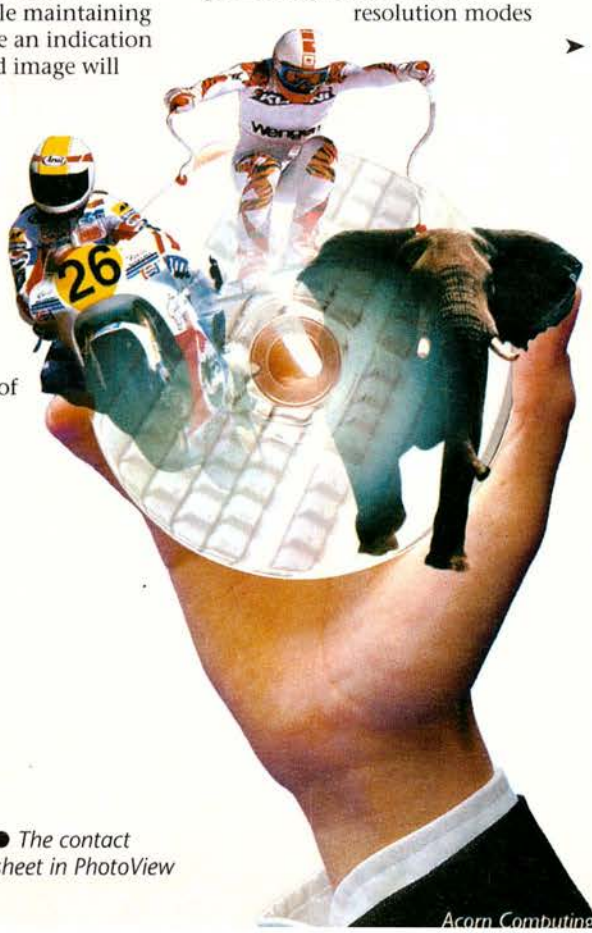
PhotoView provides a graphical catalogue of a PhotoCD in the same way as you would have a contact sheet – a term used in traditional photography for a sheet of small proof pictures – for a roll of film.

When run, PhotoView scans a special file on the PhotoCD that contains *thumbnail* images of each picture. These are small enough to make cataloguing a PhotoCD relatively quick, while maintaining enough detail to give an indication of what the full-sized image will look like.

Running PhotoView is simple, just double-click on its icon and you're presented with the contact sheet containing the thumbnail pictures. If you are using a PhotoCD with a lot of pictures – PhotoCDs can hold a maximum of 100 pictures – the contact sheet window is sized to only show the first 15 or so. This number can be more or less, depending on which screen mode you are using.

Pictures further on can be accessed by scrolling the contact sheet down – much in the same way as a normal Filer window. Thumbnail images are cached in memory as each one is loaded, which makes scrolling the contact sheet window quicker, and is particularly useful in lower resolution modes ➤

● *The contact sheet in PhotoView*



➤

where you can only see a few of the thumbnail images at one time.

Thumbnail pictures are displayed on the contact sheet window with a sort of drop-shadow effect, giving them the appearance of slides. Landscape and portrait photographs are recognised by PhotoView and rotated to their correct orientation on the contact sheet.

The size of a PhotoCD image is referred to as a Base with 4Base being two times the original, up to a maximum of 16Base which is four times the size.

Pictures at this scale require a great deal of memory to be extracted – 24Mb to be precise – and displayed, and only the new range of Acorn Risc PCs can access them. Even on a *humble* 8Mb A5000, the maximum size possible is 4Base.

If you are short on memory but still wish to extract a full 24bpp image from a PhotoCD file, an export option allows you to pull out a file and save it directly to a hard disk. Of course, you still need quite a lot of free space on your hard drive.

Extracting an image is simple, just click on the photo you want from the contact sheet and a dialogue box containing further options appears. From here, you can choose the pixel and colour resolution, plus the orientation.

Pictures can be rotated through angles of 90 degrees or mirrored about the vertical or horizontal axis. This may not sound particularly useful at first, but is indispensable if you are extracting portrait images or you want to reverse an image.

Finally, click on OK and the extraction process starts. Once the chosen picture has been loaded, you have the option of saving your picture. You can either save it in the same format as it was extracted (ie. the same number of bits per pixel) or opt for a higher colour resolution.

This helps speed up the process of accessing 24bpp pictures as it means you can preview pictures at 8bpp – which is perfectly adequate for checking details – and then save them out as 24bpp images.

One of the only criticisms of PhotoCD technology to date has been the time taken to actually extract pictures from a PhotoCD. Running PhotoView on an A5000 improves on this somewhat and extracting pictures on the new A600 Risc PC is considerably faster.

Time is not the only consideration and the quality of obtainable image is equally, if not more important. Acorn have spent considerable time *tweaking* their code to get the best possible results, even in 8bpp modes.

The accompanying pictures show just what is possible with an A5000, an expanded computer – A5000 fitted with a Computer Concepts ColourCard – and a new Acorn Risc PC 600.

All three pictures show 24bpp PhotoCD images. The *standard computer* picture shows images displayed in Mode 28 which gives 256 colours at a resolution of 640 x 480.

The ColourCard picture is shown in Mode 107, a new 15bpp mode which gives up to 32,768 colours at a resolution of 576 x 424. The Risc PC picture uses a massive 800 x 600, 24bpp mode giving true photographic-quality results.

Other PhotoCD software

As well as writing PhotoView, Acorn have now updated their ChangeFSI application to include support for PhotoCD. Images can be loaded and processed by just dragging them across to the ChangeFSI application, in a similar way to other picture formats. This does mean that you don't get a preview in the form of a *contact sheet* as you do with PhotoView. You can however, run up PhotoView alongside ChangeFSI and use PhotoView to give a *graphical catalogue* of the PhotoCD you are using.

Some PhotoCD *image extractors* on other computer systems include cropping facilities. Acorn have left other third-party developers to include such features in their own programs. With the launch of the Risc PC, 24bit-capable, image processing software will no doubt appear very soon.

There are already PhotoCD loaders available for Computer Concepts' Impression Style, Publisher and ArtWorks and other software developers are likely to follow suit in supporting the PhotoCD standard.

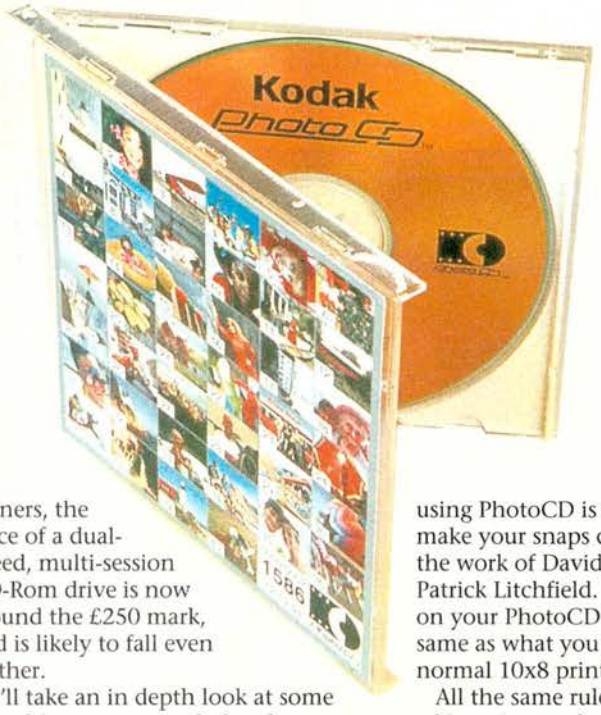
CD-Rom drives

Since the last article on PhotoCD, there have been a number of new CD-Rom drives appearing on the Acorn market. The continuing interest in CD-Rom has led to more and more developers branding their own drives and there are now well over a dozen different models to choose from.

Although the cost of drives still hasn't reached the bottom limit of similar units for sale to PC and Mac

● *Selecting a picture in PhotoView*

● *The full picture*



owners, the price of a dual-speed, multi-session CD-Rom drive is now around the £250 mark, and is likely to fall even further.

I'll take an in depth look at some new drives next month, but for now, I'd recommend having a look at Atomwide's Toshiba CD-Rom drive for its low price, or Computer Concepts' 6-disk, quad speed Pioneer drive if you want the ultimate.

Obtaining your pictures

There are two main ways of obtaining pictures on PhotoCD, either you can produce your own, or you can buy *pre-recorded* library disks normally containing pictures connected with a similar subject.

The first way means that you will actually have to go out with a camera yourself and take the pictures. Much like the misconception that a video camera is instantly going to turn you into the next Speilberg, using PhotoCD is *not* going to make your snaps comparable to the work of David Bailey or Patrick Litchfield. What you get on your PhotoCD is exactly the same as what you would get on normal 10x8 prints.

All the same rules apply to taking pictures for PhotoCD as they do to normal photographs. It's unlikely that you'll get particularly good results from a cheap camera or film and the PhotoCD medium definitely shows up any imperfections, especially at higher magnifications.

If you do plan to produce material for your own PhotoCDs, make sure you use a good quality film such as Kodak or Agfa that produces deep, rich colours. If in doubt, there are plenty of books and magazines on the subject available from most bookshops or large newsagents.

One particularly useful feature of PhotoCD is that you can have a disk made up of photographs from a number of different rolls of film. You don't have to stick a whole roll on a disk and you could theoretically have photos from almost one hundred different rolls of film.

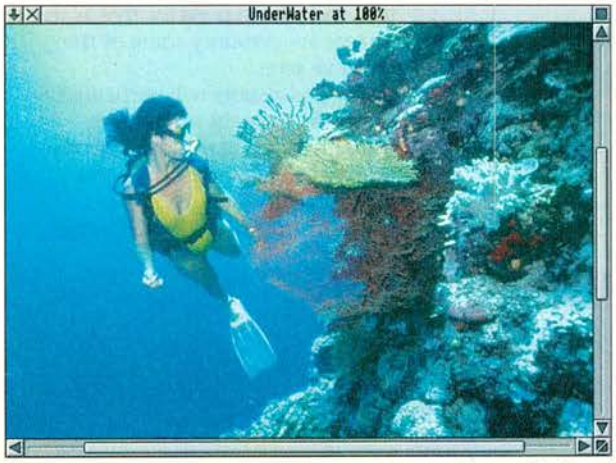
However, because of the way in which batches of photos are stored on PhotoCDs, this would waste a lot of space on the disk.

Picture libraries

If your best attempt at photography has been the bottom half of a wedding group, or a pitch black room, there is always the option of buying ready-filled PhotoCDs. These normally take the form of a disk containing pictures all linked with a particular subject and there are hundreds of titles to choose from.

Because PhotoCD is a standard, any PhotoCD disk should work with PhotoView and other PhotoCD-compatible Acorn RISC computer applications. There are a number of companies specialising in PhotoCD resource material and, with careful searching, it should be possible to find a disk that contains the sort of picture you want.

Those familiar with PCs will no doubt have come across the company Corel, most famous for their illustration package Corel Draw. Corel produce over 100 ➤



● *A PhotoCD image displayed on an unexpanded A5000*

PhotoCD titles covering subjects including everything from The Arctic to Windsurfing.

The quality of pictures is excellent, as can be seen from the accompanying screenshots, and at £39 per disk, are a relatively inexpensive source of useful images.

Although the pictures are held in PhotoCD format, the actual directory structure of the disks does not conform fully with the Kodak standard, so they cannot be read by Acorn's PhotoView application. Pictures can though, be dragged across into ChangeFSI or any other application that reads files individually.

Andromeda are a company relatively new to the world of PhotoCD and have five titles available at the time of going to press. The subjects covered are Cars, Flowers, and Landscapes.

Unlike Corel, there is no sampler disk – a selection of pictures from the whole range of PhotoCDs – so there is no way of *trying before you buy*. I can though, confidently say that there is no need for this as the images are certainly some of the best I've seen.

Car enthusiasts will particularly relish the thought of access to virtually every major car from the Rolls Royce Silver Ghost to the Ferrari Testarossa.

All Andromeda PhotoCDs cost £37.50, which represents excellent value for money, for such excellent sets of pictures. Schools, colleges and libraries can get a discount and disks cost £28 each to them. More titles are promised, to include such subjects as Graphic Textures and Space.

● *A PhotoCD image displayed on an A5000 fitted with Computer Concepts' ColourCard*

The future...

With the launch of the Risc PC computers, the graphic capabilities of Acorn computers have now reached a point where they can compete head-on with any personal computer on the market.

With the right applications – software writers and developers please note – there is no reason why Acorn computers shouldn't become *the* platform for PhotoCD and full-colour picture processing.

There are already a number of developers ready with 24-bit capable graphics packages and in the next issue, I'll be taking a look at what to expect. It's a cliche, but I can definitely promise – you ain't seen nothing yet.

● *A PhotoCD image displayed on a Risc PC 600 in a 24bpp, 800 x 600 mode*

Useful contacts

Acorn	0223 254254
Atomwide	0689 838852
Computer Concepts	0442 63933
Cumana	0483 503121
Desktop Projects	061-474 0778
HCCS	091-487 0760
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Andromeda	0235 529595

RISC user

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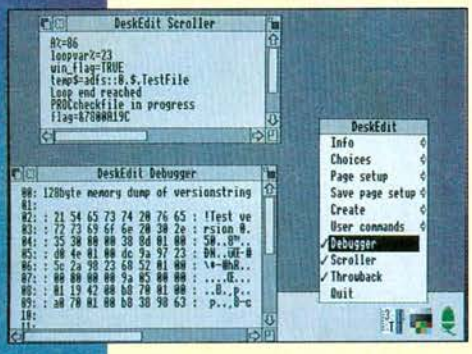
One of the most powerful and widely-used program editors for the Acorn platform - now fully tested on the Risc PC

DeskEdit 3



Whether you are programming in Basic or in C, DeskEdit 3 provides a massive range of features to assist both beginner and advanced users alike.

150 special key combinations

DeskEdit has more than 150 special key combinations supported by a high quality function key-strip for ease of use.

Edit and Run direct from the Desktop

Just open a window and type in your program with line numbers or without, and with (optional) automatic indenting of structures. Press Ctrl-Shift-F3 and it will be saved and run from within the Desktop.

Special saves

A special backup system lets you backup to a named path at any time, and a brand new safety save feature retains the last copy of any file. An Undo feature lets you Undo and Redo your editing and together with all markers and many other features is optionally saved to disc when you save a program.

The Toolbox

A powerful toolbox provides the following features:

Programmer's calculator
Basic renumber
Basic abbreviations
Customisable keyword help
Procedure lister
Procedure browser (lists all procs in a window)
Finds browser (lists all finds in a window)

A wealth of procedure & function finders

The Browser can list all function and procedure names. Click on any Browser entry to go straight to the corresponding procedure definition - or click with Adjust, and a new view window will be opened on the definition.

Multiple Search options

DeskEdit provides all the search and replace options of Edit plus some very special ones: DeskEdit's <I>QuickSearch<P>, for example, can take its target from any marked text. And a single keypress will take you back to where you started.

Move around with ease

Finding your place in a program is even easier with DeskEdit 3. There are dozens of special markers and position finder features which make scrolling through your program to find a particular line, a thing of the past.

And there's more

Plus a special input filter for automatically converting PC files etc., built-in Desktop debugger, extended file info window, special delete and tab options, programmer's calculator which can import and export data, flexible clipboard, fully customisable user commands, powerful macros, throwback etc.

Much more

And there is much much more. So much in fact that in Archimedes World's review of DeskEdit, it awarded a maximum score of 5 out of 5 in all four of its categories:

Performance	*****
Features	*****
Value for money	*****
Overall	*****

And as you may have heard - DeskEdit is so good that it is used within Acorn itself.

A single editor for a thousand different tasks

Moreover, DeskEdit is just as at-home with text (handy for editing Obey files, writing letters, or complete books), and with the C language, where it provides most of the features offered to Basic users (where applicable) with some others added - including a unique and powerful syntax checker.

DeskEdit comes with a fully illustrated 70 page manual (with comprehensive index), a function keystrip and a smart quick reference card - together with a Desktop Dustbin.

DeskEdit 3 costs £22.94 ex. VAT plus £2 p&p. Upgrade from DeskEdit 2 £5.00 ex. VAT plus £1 p&p.

Debugger now compatible with Acorn ANSI C and RISC Developments' Easy C

RISC developments

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ArcFax 1.10 £35.00 (inc VAT and carriage)
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* Trace (convert sprites to Draw files), D2Font (convert Draw files to fonts). Snapper (screen capture program), Zero (photocopier).

TWAIN – Scanner drivers

TWAIN is the name of a standard range of scanner drivers. Like printer drivers, these mean that any program that supports the TWAIN interface can use the driver. Currently available scanners;
Epson GT 6500, GT8000
HP ScanJet IIp, IIc, IIcx
Canon IX 3010 (CC Scanlight Pro) IX4015 (24 bit colour version).

ImageMaster+TWAIN for one scanner £35.00 (inc VAT and carriage)
ImageMaster alone £30, TWAIN drivers alone £20.

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Version 3 of Personal Accounts is now available

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Personal Accounts V3 costs just £49.95 inclusive of postage and VAT. **Owners of Version 2 can upgrade to the full package for only £29.95 inclusive of postage and VAT.**

The current version of Prophet (V1.38) has a myriad of extra features based on user feedback and this combined with our policy of **free upgrades** ensure that Prophet will always remain the number one choice for small business accounts software on the Archimedes.There are over 600 Prophet users which include Acorn dealers such as: 4Mation, EFF, Stallion, Spacetech, Davyn, Arm-Tech, Topologika.....

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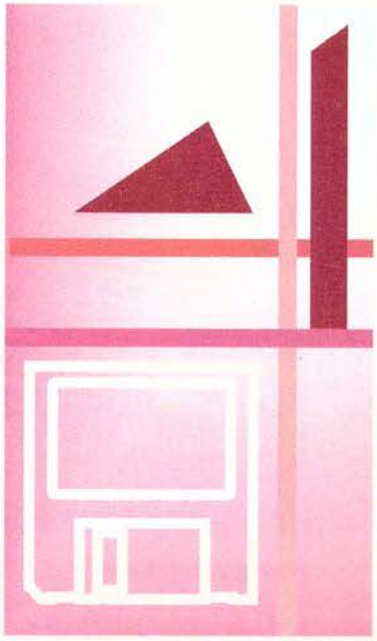
All at C with Acorn



Michael Rozdoba explores more interesting features in the C compiler

WHEN I started writing this column I was worried that I might run out of subject material. Thanks to Acorn, this doesn't look as though it will ever happen. Yes, this month we'll take a look at yet more Acorn bugs. But first a word from our sponsors.

There are a few yucky *Oops – what style guide?* errors in Acorn's C library RISC_OSLib. These may in part be due to a change in style since the code was written. However, given these problems exist, it would be nice to see Acorn make an update that was widely available, or at least release the source code generally, so that users can make their own fixes.

The following concerns the internal function *event__process* – notice the double _ characters:

- For a menu opening due to a click on a pop-up menu button, the current code will open the menu at a position dependent on the pointer's location, and not to the immediate right of the button, as required by the style guide.

  This needs modification and at the same time the code can be altered to respond with a menu creation on Select and Adjust clicks on a menu button.

  Of course, windows containing such buttons should have a menu-maker function registered, which will read the icon number under the pointer from the last event and use this to make the returned menu context sensitive.
- An icon bar menu will not be correctly positioned if it contains dotted line separators – thanks are due to Richard Hallas for noticing that my Desktop+ suffered from this bug.
- On an Adjust menu choice, which results in the menu being reopened, it may jump sideways slightly. The S-Base Developer menu does it.

  This doesn't always happen, which may be a result of the WIMP sometimes ignoring the menu position it is given on a recreate instead of using the previous coordinates automatically.

It appears that the static used to record the position at which to reopen the menu – *event__menux* – is always given the wrong value, which explains why the position should be incorrect.

If you have the source code to RISC_OSLib you can apply fixes to these bugs without too much difficulty. On the cover disk you'll find a text file describing the changes I made to my copy of the event functions source code.

Unfortunately, if you don't have the source the best you can probably manage is to try shouting at Acorn.

If I didn't have a copy of the RISC_OSLib source code, I'd find it unusable, due to the large number of bugs and its rigidity, yet with the source code it becomes an invaluable aid to the creation of desktop applications.

Fonts and sprite redirection

It is possible to write fancy text into a sprite simply by redirecting output to the sprite and then painting the text as normal. However, there is one barrier to this method – another vicious little bug.

After redirection, if using RISC OS 2, *ColourTrans_InvalidateCache* should be called – this isn't needed under RISC OS 3 as it is done automatically for you. Font colours can then be set with *Colour Trans_SetFont Colours*, and the painting of text will then work.

If your sprite has a palette it will work. The trouble starts when it doesn't. Instead of the OS assuming the default palette, it uses colour data dependent on the current screen mode. If this differs from the sprite mode – say one is 8 bpp and the other isn't – text painting may fail, often becoming invisible. Nice one, Acorn.

The work around is simple. Ensure all sprites used in this way do have a palette. If this isn't possible, perhaps because you have many small sprites and the overhead of giving them all palettes would be a waste of space, a somewhat crude bodge can be used.

Create a dummy sprite with a palette and the same bpp. Before painting text, redirect the output to the dummy, invalidate the cache, set font colours, restore output to the sprite to receive text and re-invalidate the cache.

If you wish to preserve the graphics state across this bodge, you'll need to ensure you specify a save area when you initially direct the output to your sprite.

Incidentally, I believe Acorn are considering dropping support by the Font Manager for painting text to sprites in a future OS. Don't do it. This can be very useful, though it would help if you could iron out the current bugs for the next release of RISC OS.

Graphic tablet flashback

The Watford Electronics graphic tablet conflict with RISC OS 3 is back. Some owners have had problems using !OS3_Fix to patch Watford's module so that it will work under RISC OS 3. On this month's disk is another version which should make it slightly simpler.

Stop me, buy one!

Don't forget, 42 may be the answer, but we have yet to discover the questions. If you have a question, it is your duty to society to write in, so do it NOW.

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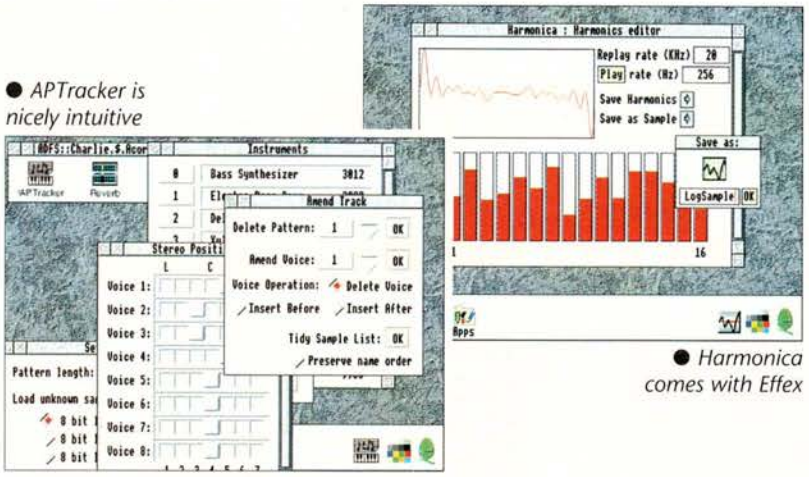
Ne'er cast a clout til...

...but Teri Paul goes in for a little reorganisation to make room for a new machine

YES, I've seen it, touched it and fiddled with the nifty spring-loaded disk covers, the Risc PC is here. Its cool grey will look nice on my desk alongside my A440 and Master, all I have to do is convince my bank manager ...but I have sad news, not all PD will work on this new baby...

Anyway at the time of going to press you couldn't buy one even if you did have the money, but let's not worry about it and get stuck into what's available now.



● *APTracker is nicely intuitive*

● *Harmonica comes with Effex*

Overtures and beginners

On a musical theme, this month we have Paul Mason's **Effex**. This is a sample editor which comes with a bonus application called **Harmonica** which lets you create samples by fiddling with the harmonics. Useful if you're studying music to any degree or, for that matter, if you just like messing.

From Andrew Pepperell comes the latest version of **APTracker**. As well as allowing you to compose music you can now experiment with a sample editor and synthetic sounds compatible with the Harmsynth file format.

In addition you can load Tracker, Sound Tracker, ProTracker, Coconizer and Oktalyzer files plus Armadeus, Tracker, DSEdit, SoundSynth/Rhythmbox and raw format samples. Was there anything else you need? A nice finishing touch is the inclusion of a drawfile keystrip.

All in all a very useful addition for anyone who wants access to the maximum amount of tunes, tracks, samples and noises regardless of their origin.

Working on similar – but more constrained – lines is Gareth Boden with **ClownPlay**. This has a single raison d'etre, and that is to plan Coconizer tracks with a tad more control than the volume-only control on the player supplied with Coconizer.

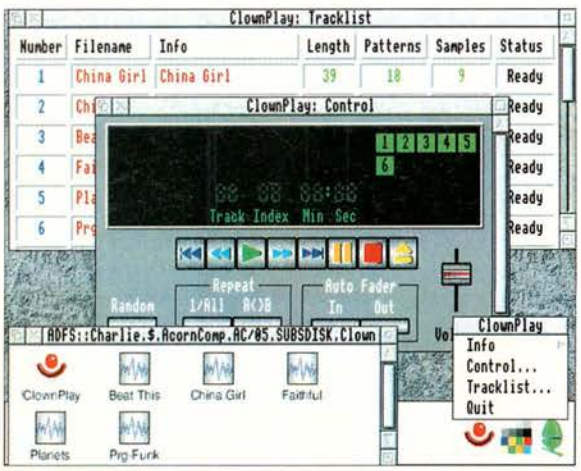
ClownPlay has a CD-style display and controls, with one menu giving you control over the main display/control window and the tracklist window. This can also be accessed by clicking Adjust over the iconbar icon.

The tracklist window simply contains details on the tracks the player currently knows about. The details shown are the filename, any extra information, track length, number of patterns and samples as well as the status – empty, ready, playing, paused, played and so on.

ClownPlay works on files containing up to 20 tracks – just drag a file to either the iconbar or on to a window, or if you prefer just double-click a CocoTrak file. This will be added to the track list but isn't actually loaded into memory until it's played. Very useful if you are limited on memory.

Other controls at your disposal are fades in and out, random play, repeat and the number of the track playing. These are in addition to the usual play, stop, pause and so on, but you can also skip and search simply and intuitively.

Gareth is still working on ClownPlay but it worked perfectly with my Coconizer files.



● *Get that CD stacked*

In this issue...

Program	Library
APTracker	Subscription disk
ClownPlay	HeadFirst PD
DrawGrab	Subscription disk
Effex/Harmonica	The Datafile
KingOut	Gem PD GaSi11
RiscTimer	HeadFirst PD
Sevens	Gem PD GaCG02
TempGrab	HeadFirst PD
WimpZarch	Subscription disk

Book work

DrawGrab also comes from Paul Mason and the C source code is included too. Simply, this program allows you to drag a drawfile to the DrawGrab icon and save it as a sprite file in the mode you are in.

You can alter what part of the sprite is saved out by resizing the window. Also, use the zoom box ➤

PD LIBRARIES

8-BIT HOUSES

8-bit Software, 17 Lambert Park Road, Hedon, Hull, East Yorkshire HU12 8HF.
BBC PD, 18 Carlton Close, Blackrod, Bolton BL6 5DL.
HeadFirst PD, 97 Chester Road, Southport PR9 7HH.
JJF PD, 49 Hollyberry Close, Winyates Green, Redditch, Worcester B98 0QT.
Mad Rabbit PD, PO Box 4, Crigglestone, Wakefield, West Yorkshire WF4 3XE.
Masterdisc, 2 Seaview, Hoylake L47 2DD.
Welsh Boys PD, 88 Queen Street, Barry, South Glamorgan CF62 7EE.

32-BIT HOUSES

3PD Swapshop, 66e Picardy Road, Belvedere Kent DA17 5QN.
Alpine PD, PO Box 25, Portadown, Craigavon BT63 5UT.
APDL, 39 Knighton Park Road, Sydenham, London SE26 5RN.
Arcaynia, PO Box 1927, Sutton Coldfield B74 3QZ.
ArchAngel PD, PO Box 41, Exeter, Devon EX4 3EN.
Archimedes Fractal Group (AFG), 30 Bowen Drive, West Dulwich, London SE21 8PN.
ARM PD, 109 Woodland Drive, Cassiobury, Watford WD1 3DA.
ARMistic PDSL, 136 Wellesley Road, Ilford, Essex IG1 4LJ.
Craig Beech PD, 30 The Deerings, Harpenden, Herts AL5 2PE.
Datafile, 71 Anson Road, Locking, Weston-Super-Mare, Avon BS24 7DQ.
Datastream, 34 Norbreck Close, Great Sankey, Warrington, Cheshire WA5 2SX.
Different Ideas, Eyton House, Eyton, Leominster, Herefordshire HR6 0AG.
Digital Phenomena, 104 Manners Road, Southsea, Portsmouth, Hampshire PO4 0BG.
DigiTech, 20 Downing Crescent, Bottesford, Scunthorpe, South Humberside DN16 3LS.
Eureka PD, 78 Rawlinson Road, Southport, Merseyside PR9 9NE.
Gem PD, 15 Partridge Down, Oliver's Battery, Winchester, Hampshire SO22 4HL.
HeadFirst PD, 97 Chester Road, Southport PR9 7HH.
LowCost PD, 6 Furzeland House, Sheephouse Way, New Malden, Surrey KT3 5PH.
Moonlight Graphics, PO Box 3569, Cape Town 8000, South Africa.
Naked PD, Fayence, Fulford Road, Fulford, Stoke-on-Trent ST11 9QT.
Planet PD, 37 Manor Drive, Berrylands, Surbiton, Surrey KT5 8NF.
Skyfall, PO Box 2220, Birmingham B43 5RZ.
Swop It PD, 7 Salterns Terrace, Bideford EX39 4AG.
The Chroma Project, 153 Holt Road, Fakenham, Norfolk NR21 8JF.
Westbourne Services, 34 Bradley Street, Wooton-under-Edge, Gloucester GL12 7AR.

➤

from the main menu to alter the scaling of the drawfile.

I've found that it meshes very nicely with a program called **TempGrab**. A simplified version of this wended its way to me, courtesy of HeadFirst PD, with a limited number of features actually working.

You can, however, grab windows off the screen as sprites – with a time delay if needed. You should be able to grab them as drawfiles and drawpaths too, but I ran into some glitches when I tried this.

Just load it on to the iconbar where it will tell you it is ready. Click Menu to access the choices screen where you can set the grab delay, have the timer showing on the iconbar or at the mouse, grab a window as a sprite file or drawfile and grab user-drawn graphics as a sprite or draw path.

You can even replace the system font with any in your font directory, specifying the height and aspect. When all is set and saved if needed, click Select and off you go.

Another utility I've found quite useful recently, is **RiscTimer**. You could use this to keep track of *little fingers* on your Lemmings, but I find it quite useful when working to decide how much time I have spent working on a particular topic or item.

Basically, it records the time the computer is switched on and the amount of time it is actually being used. It keeps track of the last 28 days' usage and displays the information in a window.

You need a hard disk to add RiscTimer to your Boot file and remember to always use the desktop Exit or Shutdown before switching off.

If you don't do this, then Risc Timer won't know to save its log file and the computer usage will not be recorded. As a safety precaution, RiscTimer saves the log file every 10 minutes.

If you have your Config set for no font cache change this to a small amount, otherwise the fonts used in the windows will slow things up.

Now you can find out how much the computer has been used by clicking on the iconbar icon with Select or Adjust. A window will appear giving details of the computer usage.

The Quit option quits the application, but does not remove the part of the program registering usage, so if RiscTimer is loaded later the time used in-between will still be recorded. However, the usage will not be saved without the program being present.

The program checks for key presses and mouse clicks and every time they occur the program reads the system clock. Simple but effective and if more than two minutes passes with nothing, RiscTimer assumes that the computer is not being used.

Light relief

As May is full of bank holidays, school breaks and the usual British weather you could do worse than add a little *free* entertainment to your computer.

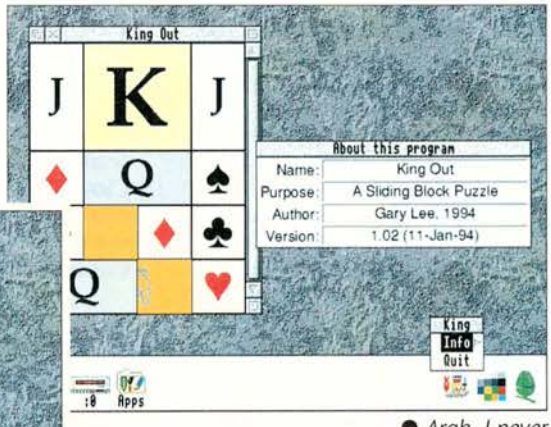
As I am an avid player of SPatience, I am always on the look out for new card games. **Sevens** is a nice game played by you and three computer players. The rules are simple.

You must place the four sevens in the centre and try to get rid of your cards before anyone else, adding to the piles in order and suite above and below the sevens. Sounds complicated, but it's mega easy to understand and to play. Definitely one for the hard disk when Seahaven Towers palls – if ever.

On the other hand, KingOut is not a card game despite the name, rather it is an exceedingly frustrating sliding block puzzle.

If you have got a copy of Zarch – if not buy one now, it's on a Superior Sam compilation – you can now play it in wimp mode. **WimpZarch** adds to the original game allowing you to play it on the desktop. I still can't control it very well, but I do better than with Guile.

● *Ah good. Now I can get rid of the nine*



● *Argh. I never could do sliding block puzzles*

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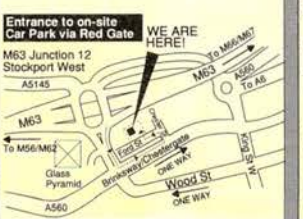

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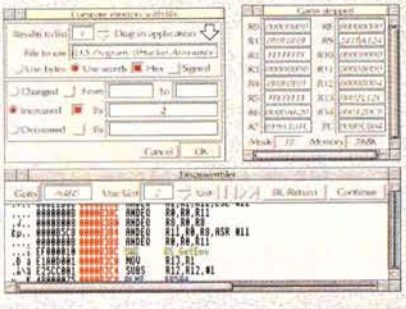

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Do the Acorn juggle

Mike Cook uses your Acorn to teach basic juggling as well as a few tricks

HAVE you noticed how juggling has become more popular over the past few years? As well as all the street entertainers you see there are those tempting juggling books complete with small sacks to juggle.

However, the problem with a book is that it is limited to photographs and diagrams, it can't show you how the balls fly. So the Editor thought it would be a good idea if we could get our computer to give the juggling lesson.

Well, it's one thing the Editor having a good idea but guess who cops for writing the thing! Looking through some old magazines I came across an article by Nick Craig-Wood, his code gave me a head start in this project and set me on the right lines.

Juggling is quite easy, all you have to do is to throw a ball and catch it, that just leaves the niceties of which ball to throw where and when. I don't know if you have noticed but there are a large number of patterns that juggling balls can follow. Not only concerning the number of balls but the paths they follow in the air can vary.

In order to communicate juggling patterns there are a few standard notations, the one that I have used is that specified by the Cambridge Jugglers Association (CJA).

In this, a pattern consists of a sequence of integer numbers, from 0 to 9, infinitely repeated. However, you only have to specify the first unique sequence, hence a sequence 5151515151... would only be specified as 51.

All very well but what do the numbers mean? Well, time is divided into a number of arbitrary units called ticks, and at each tick you perform the instructions given in the pattern. The number indicates how long, in ticks, a ball must stay in the air, and balls are thrown from alternate hands.

That means that on odd numbers in the pattern you use your right hand and on even ones you use your left hand. There are just two exceptions to this, a pattern number of 0 indicates no throw and one of 2 means you have to keep the ball in your hand for two ticks.

Let's look at the 51 pattern. Throw a ball up with your right hand so that it travels up in a high arc to land in your left hand 5 ticks later. Then, while the ball is still in the air, throw a ball from your left hand in a low arc to land in your right hand one tick later.

Next, throw that ball to your left hand, a 5 high-arc throw, and finally another ball from the right hand in a 1 low-arc throw that gets sent high with a 5 throw.

You have just thrown 51515 and the first ball is coming into land ready for the next 1 throw. This means that you need no more balls and can carry on the pattern with the three you have.

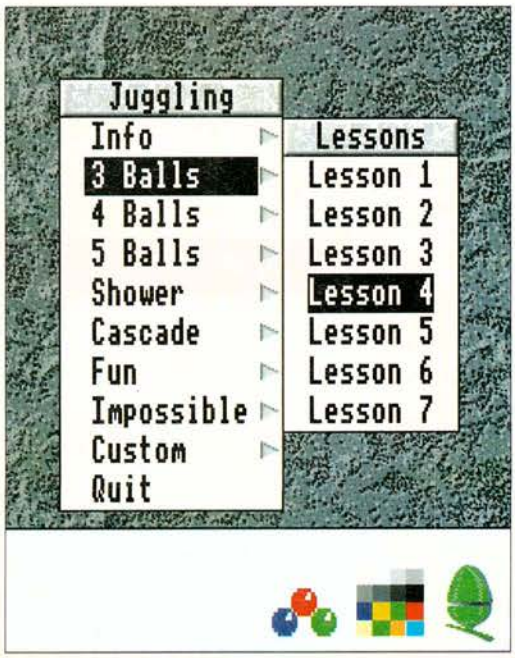
This is the standard clown's three-ball juggle or *round in a circle* to be more correct. You can see that interpreting the juggling notation can be a little tricky and it sounds quite complicated when said in words. However, a computer animation can make things so much easier.

There are a few rules that stem from this notation, and one gives you the number of balls needed to juggle it. This is simply given by the average of the numbers in the pattern. For the 51 pattern, adding all the digits gives us 6, and then dividing this by the number of digits, in this case 2, gives us 3 which shows us the number of balls we need.

A powerful check on whether a pattern can be juggled is to see that the number of balls needed comes out to be a whole number. Another rule is that you can't throw and catch a ball at the same time.

To test this you need to add 1 to the first digit in the pattern, 2 to the second, 3 to the third, and so on. When you have done this all the digits in the pattern should be different.

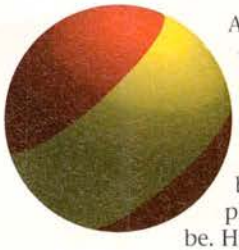
What the notation can't cope with is throwing a ball with both hands, throwing more than one ball, or catching more than one ball at a time. While it is possible to ➤



● *Follow the set patterns or make your own*

juggle with these sorts of moves it is very difficult and hence is not so often performed.

The program lets you enter your own pattern as well as having a number of standard patterns built in. When you have selected a pattern you are treated to an animated display of my son Alec performing the juggle.



What I did was to digitise Alec standing with his arms out, then using Revelation, cut off his arms and saved them separately.

I then used the cut and paste function to put the background pattern over the place where his arms should be. His mother questioned whether I should be doing such a thing, but it's armless (sorry).

When juggling, your hands tend to move in small circles. I couldn't quite manage that in the time available between frames so Alec's arms move from side to side. Still, there is a strong impression that he is juggling.

The position of the hands and trajectory of the balls is worked out before the animation and the software plots the sprites in the correct place using a standard screen-bank switching technique.

This is where all the drawing is done in a bank of memory not being displayed, when complete it is switched to display and the other bank is used for the next frame. The juggling pattern is displayed in the top left-hand corner and there are buttons to speed up or slow down the action. This is done by changing the number of steps in a pattern, the finer the movement the more time it takes to produce.

● *When it comes to round juggling, start with one...*

● *...move on to two...*

● *...and finally add a third*

Probably the best things to learn to juggle with are small bean bags, you could make them with sand or rice, or purchase them from a book shop or speciality juggling shop. Practising over the bed is a good idea but anywhere out of the reach of breakable objects is fine.

Remember, you have to throw the balls up and not forward, this is the hardest trick to learn. When you have learned a pattern one way round, you must learn it in the reverse direction, using the opposite hands.

Now is the time to try to learn to juggle.The program has a number of lessons for juggling three, four and five balls, but start off with lesson one for three balls. This is a 300 pattern and is simply tossing a ball from one hand to the next. However, it is an important start. You throw on the outside and catch on the inside in a distorted figure of eight.

Remember the hand movements are the least accurate feature of the program. You don't have to follow them, just get the ball flight right. Watch the top of the arc not your hands, throwing the balls to head height.

There are some other fixed patterns to try with the program, along with some patterns that are clearly impossible to do in Earth gravity. You can also enter your own patterns and the program performs a few rough checks to make sure that it is possible. Try and experiment with these values, for example you can always put a 53 in any pattern of 4 balls like the 534, 5344 and 53444.

Having mastered a pattern you seem to be able to juggle on *automatic pilot* and can watch TV or talk at the same time, or even be blindfold. The secret is to practice little and often.

Juggling has a great therapeutic value and is often credited for relieving stress – once you've mastered it that is.

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...that Mark Anshel and Robert Singer from Florida State University used juggling as a basis for study resulting in their paper *The Effect of Learner Strategies with Modular Versus Traditional Instruction on Motor Skill Learning and Retention.*

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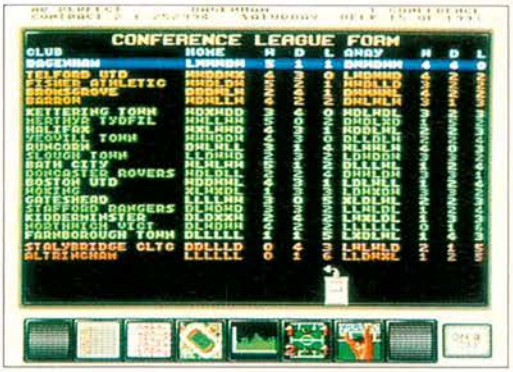


● *Lets's see how my team is doing*

THIS latest in football management programs allows you to take on the job of managing a lowly non-league club. The idea is to guide your team to the ultimate goal of playing in the Premier League and winning European trophies. To attain these goals you need a lot of skill, knowledge of the game and a fair amount of good luck.

The writers have successfully recreated the pressures that are put on a football manager, but a few things are incorporated into the game which, in the real world, do not form part of his job.

I realise that incorporating these factors makes it more complex, but I found it tedious having to break from managing the team to work out which sponsors are put on the advertising boards situated around the ground.

The game begins with you selecting the Conference League team you wish to manage. Up to four players can take part, each selecting a team to manage. After finding about 20 sponsors for the advertising hoardings I got down to the business of examining my team.

Each player is given a rating, presumably between 1 to 100, in four skills – handling, tackling, passing and shooting – the higher the number, the more skilful the player.

Comparing my team to the others in the same league, I realised that I had to buy new players or become the shortest reigning manager in history. You can look for players in two ways, either by examining the transfer market or setting your scout to look for the type of players you're after. The next job is to instruct the team coach to train the players.

The day of your first match eventually arrives. Having selected the 13 players for the match – 11 and 2 substitutes – decided on what formation the team will play in and the style of play, you select the *play match* icon and sit back to watch how your team performs.

Stalybridge, I decided, would play a 3-3-4 formation and, armed with my latest signing, a new striker, I opted for an attacking style. My confidence was high as the match kicked off.

As the match is being played, you can watch the game – sort of. The location of the ball on the pitch is indicated on the screen, along with a sort of running commentary of who is in possession of the ball and a little semi-animated picture showing a player with the ball, taking shots at goal, or the goalkeeper attempting to make a save.

I was a little disappointed that, no matter which team had possession of the ball, the animated player always wears white. You can control the speed of the simulated game. The *very slow* option causes the match to actually take about 10 minutes to play, but you can speed up the game through slow, medium, fast, very fast and finally *ultra* where the match lasts about a minute.

Stalybridge kicked off against Farnborough and, yes, you guessed it, we got thoroughly thrashed, 4-1 at home. Obviously, I had my work cut out. No matter how much I spent on new players, I couldn't raise my team off the foot of the table.

Then, the miracle happened, I received a fax from Howard Wilkinson of Leeds. He offered me a player called *Catona* on a free transfer. I snapped him up and found that I had gained a top class player for nothing. I wonder why...

Hastily, using the game's edit player facility, I changed the new player's name to Cantona and put him in my forward line. We finished the season seventh in the league. The tide had turned.

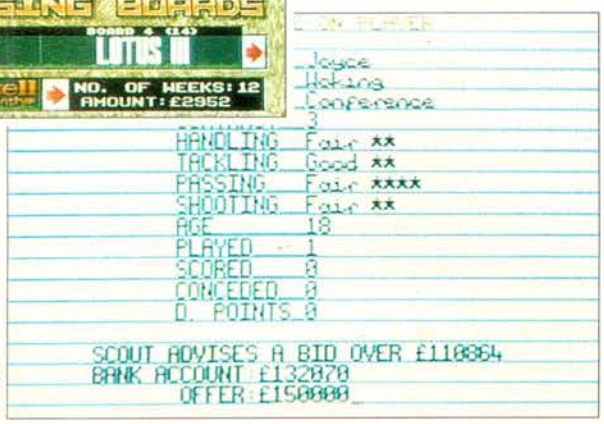
Next season we were promoted as champions and the season after that saw promotion again into the second division and a cup run which led us to the semi-finals. Not even the tragic death of one of my top players after he was struck by lightning was going to stop our march to glory. We even managed to win when Cantona was playing for England(!).

It all turned sour for me when, in the middle of the season, at the peak of his career, Cantona decided to retire to run a country pub. That was the cause of my ruin. By the end of that season I had run up a large debt – nearly £1,000,000 – and was sacked for *appalling management*.

Huh! After all I'd done for them. I was as sick as a parrot I can tell you, Brian.

Rob Donaldson

● *There's more to management than winning games*



● *Use your scouts*

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James Pond II+ ...a fish too far

EXTRA levels for popular games are always a good way of extending the life of a product, but they have to be better than the original to make you think you are getting something special for your money. How does Robocod II+ stand up?

Well the initial screen is the same, as are the controls and scenario as you'd expect but the doors lead to five new levels, some really enjoyable tunes and a slicker presentation packed with the tricks and puzzles of the original.

The levels are not harder, just different, so even if you didn't finish James Pond II, you'll still be able to play II+.

It's a few months since I played with the walking fish, but the extra levels encouraged me to dust off the first floppy and see if I could do any better this time around.

If you enjoyed the original Christmas adventure, and hanker after a bit of snow this summer – though with the weather we've been having lately we might well get it for real – then give these extra levels a whirl.

There's quite a lot in this but whether the five sets of levels and music are worth the money will be up to you and your liking for Mr Pond?

Pam Turnbull

● *Whoops, two lives left. Now that jelly-snowman is for it*

PRODUCT SPOTLIGHT

Price: £7.99 (to existing Robocod II owners)
Supplier: Gamesware, Unit 26, The Bartletts, Hamble, Hants SO3 5RD.
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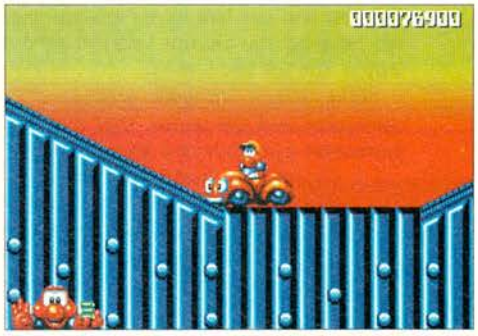

● *Surprise boxes may hold a car – I love the hat – or something not so nice*

● *I can't get the hang of this – avoid the deadly birds, but hop on the pack of cards to avoid the pins*

● *A tad outnumbered here – where's Q when you want him?*

Anti-grav ...a bit of a boost

● *Easy does it ...now I just have to set down on this thing*

I'VE seen this game before somewhere... someone said Lander which is close but it's got a bit more of Thrust in it too.

The scenario runs something like this: The filtration units of a newly-colonised underwater sea-base have been knocked out of kilter by a planet-wide earthquake and have to be shut down – and there's only one vessel capable of doing the job and you're the pilot.

Okay it's not original but who cares – the author obviously doesn't because the jokes come thick and fast.

You have to disable 30 of these units which are located in caves that require some dextrous flying to negotiate. The ship is equipped with a rudimentary anti-gravity device which allows it to fall at a uniform rate, although there's a *fast drop* option, you can thrust left and right slowly or upwards at fast or very fast speed.

The music and sound effects are adequate and fully controllable, the graphics are simple but effective and more complex as you go through the eight levels. It also gets much more difficult.

PRODUCT SPOTLIGHT

Price: £5 (includes p&p, mail-order only)
Supplier: Delta Software, 36 Burgate, Canterbury, Kent CT1 2HA.

The most important thing in any game, regardless of price, is playability and this one's not too bad. It has a reasonable amount of *have another go*-ness which goes along with the frustration of failing to shut down that filtration unit for the 50th time when it ought to be really easy.

If you do succeed in getting through the whole thing, a level designer is also included which lets you extend it even further. I'd say this is a really good buy.

Lazarus

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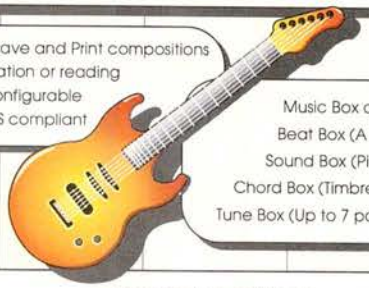

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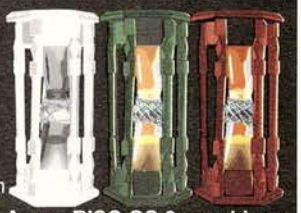

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The fish in

I LEFT you waiting at the Opah University underground station last time, and now it's time to catch a train for Eelpout. Once there, you should make two moves out and two west so as to finish up in the pub in Plaice Street, where you'll meet three characters, one of whom is the villain.

If you have been following my ever-so-subtle hints, you should have a good idea who it is, but in case you haven't, save your position here.

You get a cheerful greeting from Bertie Bream, Ernest Chub and Simon Tench. You now have to invite the person you suspect as the villain to a disco and, no, I'm not going to say who the villain is. You have saved, haven't you? Whoever you invite will accept and arrange to meet you later.

Two moves east and one south will take you to a place closely resembling my local guitar emporium (I play a Fender Strat, mostly) and there you'll see those vital accessories for a disco, a pair of earplugs. Buy 'em and wear 'em.

One move out and one southeast will take you back to Eelpout underground station where you should catch a train back to the University.

Wait in the quadrangle until your suspect villain turns up. A rendezvous time should have been agreed and you can enter the command WAIT UNTIL *** (whatever time was suggested). However, when your companion arrives he won't want to go into the disco without a tie. Make him wait, even though you are wearing one. Go back to the laboratory, drop what you are carrying, apart from your various cards, and then go back to the quadrangle.

Now pass your tie over and you'll find that your suspect is willing to enter the disco. Provided you are still wearing the dark glasses and the earplugs, you will be able to tolerate the disco environment. The villain will not and he'll throw a wobbly and confess all. So, if you don't get a wobbly confession, go back to your saved position in the pub and try again.

Leave the disco, catch a train to Paddlington, go to your apartment and collect the hyperdriver. Now catch a train back to the University. Enter the University and continue east until you need to put your id in the slot.

After that, one more move east and one northeast should get you into the project room where the device looks just like a gravel-filled aquarium. Examine the device and you'll see a stream accelerator. Examine that and you'll discover a lockscrew.

If you try to unscrew the lockscrew with the hyperdriver, the penitent villain will bang on the door, warning you of a booby trap. The only answer is via the computer and one of the programs called Shutdown. You'll have to login as the villain and he'll give you his password (which he thinks he remembers).

Move into the laboratory and sit down. Enter the villain's name and the password he gave you, access the games directory and choose the game Shutdown. Now comes the difficult bit.

You've got to produce the word WATER from a jumble of five letters. The puzzle is based on the fact that our alphabet contains 26 letters: A=1, B=2 and so on. My jumble of letters was GFCFC.

It's worse than that, though, because when you change a letter, the adjoining ones also change. Consider the five letters as cells. When you change cell three, the letter in cell two is incremented by two, when you change the letter in cell four the one in cell three gets three added to it – and so on.

The only cell not to affect the others is cell one. So the second letter needs to become a Y first of all, so add 19. The third letter needs to become Q – add 14 to it – so now the second letter is the desired A.

Next, change the fourth letter (F) to A so that when you add 15 to the last letter it will become E. In my case the word now looked like this: HATER – nearly my name, but not my nature. Lastly I added 15 to cell 1 and there was the desired WATER.

You have 40 moves to do it, so don't despair, although I strongly advise you to save before starting.

Quit the games directory, logout and get up. You can now see why stuff was dumped here. Get everything – the screw, screwdriver, focus wheel, tuned crystal, photon bridge, filter and radio case – and head back northeast into the project room. Now that you've successfully solved Shutdown, you can safely remove the lockscrew with the hyperdriver. You now have all the ingredients to save Hydropolis and need to assemble the various bits in order to create a regulator which you then screw to the device with the lockscrew.

Funny thing is, sometimes I can do it successfully and sometimes not – dunno why, though. Have any of you got any ideas?

The saga continues

Stephen Mumford has written in with information that may well

the disco

help players of Wonderland. His hardware configuration is as follows: A3010 and RISC OS 3.1.

Stephen writes as follows: *I've got an A3010 and discovered that the adventure game wouldn't work, although it ran perfectly on other models.*

However, I tried altering the monitor setting with the !Configure utility of RISC OS 3.1 from Automatic Type Detection to Normal and from then on my version ran perfectly.

F.R. Peddie had trouble with the game on both his A3000 and later on his A5000. Having trouble with another application, he was told to type ADFS at the command line, so he tried it with Wonderland as well.

It worked, so he deleted it from his SCSI hard drive, installed it on his IDE drive and it runs perfectly.

If you are having trouble, either method is worth a try, depending on your hardware configuration.

Soft Pawn

Last time I left you with a giggly Guru who bade you collect him some nourishment essential to all mortals before he'd deign to answer any questions. The vital stuff is, of course, water.

The secret here is to realise that melted snow will do. Leave the hut, moving southeast, east and then north to the foothills. A large boulder will block your path but – as my old mate Archimedes was wont to observe – provided you have sufficient leverage, obstacles are no problem.

What you need to do is to tie the hoe and the rake together with the shirt used to cover the wristband and then lever the boulder aside. A way to the northwest is then revealed.

Once past the place where the boulder was, your way is blocked once more by rocks, but don't despair, they can be climbed. Ignore the awesome opening to the east (you don't have a light-source yet) and go northeast and up to the plateau.

It's pretty chilly up here, so fill the bowl with snow and retrace your way back to the hut. Give the bowl to the guru and in return he says to you 'Some light in the forest would help you and the trees'. We must live in harmony with nature, you know.

I know a clue as to a light-source when I see it, as I'm sure you do. Anyway, one good turn deserves another, so untie the shirt from the hoe and the rake, put it on and drop the tools so that the saffron-robed sage can be a gardening guru if he fancies a little exercise.

Help yourself to the rice and leave the hut. Southeast and two moves south will bring you to a forest clearing where there is a tree stump. If you look in the tree stump, you'll find a pouch: Get it and look inside. It contains a red, a green and a blue, so mix them together – they form a brilliant white, and that's your light source.

More next time.

Hatter's helpline

I recently got my sticky paws on the desktop adventure Haunted House from 4D, but as yet haven't had time to make much progress so, can anyone help Jo Kenny?

She has a number of queries: How to pass the ghost in the entrance room so she can enter the kitchen? Is it possible to linger in the bathroom and how do you light the lamp?

Minor queries: What's the note in the shed mean, does the leaky glue have a use and why does the amount of toffee papers increase?

Jo started adventure gaming with Philosopher's Quest and would like to see it ported across to the Arc. Talk to those nice lads at Topologika, ma'am – you never know, especially as it had a revamped version anyway some years ago.

Next, a few general tips from John Forrester for The Dungeon – which has also just fallen into my hands.

Extinguish any candles or torches before sleeping, spread the weight of carried objects between the characters so as not to slow down the party's progress, collect as much food, water, spell flasks and chests as possible and kill as many monsters as possible by fighting, as this builds up your character strength. Don't waste mana – keep casting spells.

More from John next time. Keep at it. Mad Hatter.

Elite time

David Seery has written in with some observations on Elite. At the time of writing, he was close to becoming ELITE.

First, he notes that you can actually sell specific quantities of cargo, despite what the manual says to the contrary: Simply enter a numeric value instead of the Y/N requested.

He also notes that his status screen is often yellow when there's no ship appearing on his scanner. The culprit is usually a Fer-de-lance: He's noticed that they always use the same combat technique and wonders if this is programmed in. I guess so. His version of Elite (Superior) on Master 128 doesn't permit the mining laser scam that has been mentioned in this column, nor can he use the escape capsule ploy when stuck in witch space.

He has also kindly sent me a cheat program for UIM where he has elaborated on the custom-submariner program featured in the Hac Man column a few years ago. If there are any frustrated submariners out there, please send a formatted DFS 5.25in disk and I'll gladly copy David's program for you.

Peter Warlow has dusted off an old copy of Elite but minus the manual – so he's stuck for some keys to hit for various functions. As it happens, I've lost my original Elite manual too but, on the basis that ArcElite was a faithful conversion where the keyboard was concerned, here follows a list of some of the essential keys to functions he can't find.

Energy bomb:	Tab
Escape capsule:	Esc
Galactic Hyperspace:	Control+H
ECM system:	E
Docking computer on:	C
Docking computer off:	D
Target missile:	T
Launch missile:	M
Untarget missile:	U

Jettison a cargo canister: Del

Hope that gets you mobile and menacing, Peter: Improve your combat rating and you'll soon discover the two Missions in Elite.

Jamie Nicol dropped me another line about ArcElite – specifically Mission Three – and reckons it's not so much a mission as a warning. Be that as it may, he was a Competent Offender at the time (something odd about that phraseology), had over Cr120,000 and had managed to sort son of Pino out.

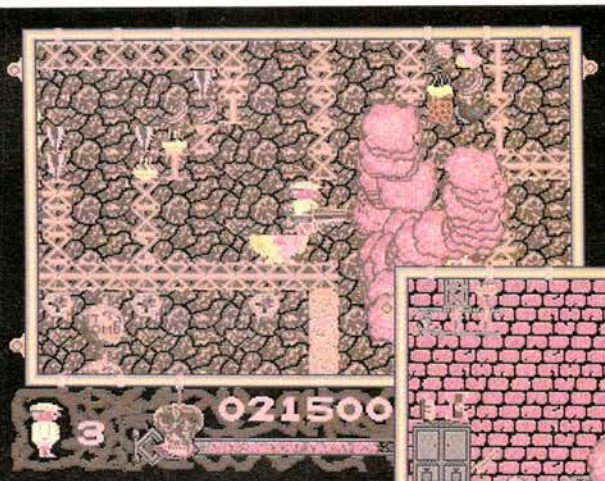
Zartid is a slippery beast, though. The reason I mention Jamie is because he is accruing wealth at the right rate. Take note.

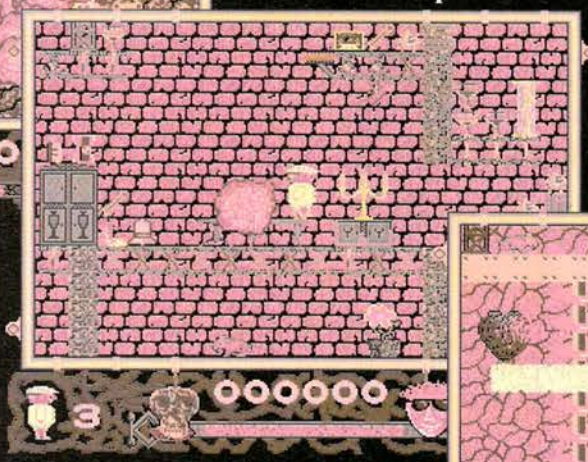
Finally, in Elite II (PC version) I am Competent, can charge passengers a premium to carry them and collect half the dosh up front.

For all Acorn 32-bit RISC machines running RISC OS.
Requires 1Mb.

Asylum

A platform shoot-em-up in inner space....





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Sound addition

Sound cards are a new feature for the Acorn market. Rob Miller takes a look at the first on offer

ALL Archimedes computers use a video controller – *Archimedes* refers to all ARM2, ARM250 and ARM3 machines. The VIDC10 can already be found in the ARM250 chip in the A3010, A3020 and A4000 and creates their sound output with older machines using a separate VIDC chip.

The VIDC10 is limited to only 8-bit sound, which is clearly enough for most applications, but severely limiting if you wish to produce professional sound quality.

With the increased interest in multimedia, the quality of sound output is becoming more and more important. On other computers such as the PC and Apple Mac, the market in *sound modules* is booming and there are a number of *one-box solutions* from the likes of Roland, Yamaha and Korg that can be used to improve the sound capabilities of your computer.

On the Archimedes however, hardware developers have been slow to devote time and resources to this area because of the Arc's small presence in the computer sound market.

A new company, Expressive Software Projects, have decided to take the plunge and have produced a fully-fledged, 16-bit sound expansion system for Acorn RISC computers.

The SuperSound Expansion System 1600

The SSES 1600 comes in two parts. The first is an expansion card that fits into any computer equipped with a suitable backplane. This card contains all the digital electronics and includes all the chips necessary to synthesise sounds, as well as a library of over 200 ready-to-play sounds in rom.

The second part is a small white box (roughly 2in x 8in x 5in) that houses all the analogue circuitry. It also contains all the sound output connectors as well as three Midi sockets. The I/O unit is linked to the expansion card by means of a one metre cable.

There are several reasons for having the SSES 1600 split like this: First, the analogue circuitry can be better isolated from interference such as monitors. Secondly, it makes future expansion – 16-bit sound sampling for example – much simpler.

Rather than having to upgrade the whole set-up, you just return your I/O unit to ESP and they exchange it for an updated version. The back of the box is bigger than the back of the expansion card which in turn provides more space for additional sockets if they are required.

What can it do?

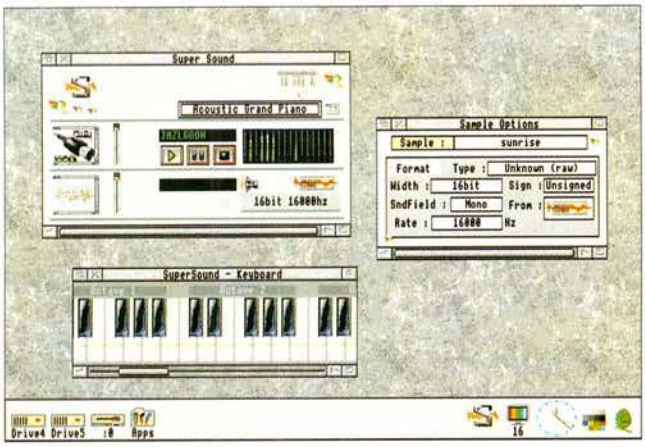
There are three features that the (current) SSES 1600 provides. First, you get a 16-bit, CD quality wavetable synthesiser with 128 instruments and 49 percussion sounds. The synthesiser complies fully with the General Midi standard and hence will work fine with other instruments of this type.

The General Midi standard is now used by most synth manufacturers and provides a fixed list of instruments, drum sounds and sound effects.

A standard Acorn-compatible, 16-channel Midi interface has been included and provides In, Out and Thru ports. The synth itself is actually part of the SSES 1600 and does not require connecting. Other instruments can be connected via the Midi interface – a keyboard can, for example, be connected and used to play the sounds on the SSES 1600 directly.

Finally, the SSES 1600 can be used to playback 16-bit sound samples directly from the Archimedes' memory. At present, this can only be done via a special application (included in the package) but future versions of the SSES 1600 will provide low level software support through standard commands.

Better integration into the Arc's sound system is also promised enabling such things as 16-bit sound from Replay films, as well as support for other 16-bit sample formats.



● *The SSES 1600 in action*

PRODUCT SPOTLIGHT

Product: ESP SuperSound Expansion System 1600
Price: £299
Supplier: Expressive Software Projects, Holly Tree Cottage, Main Street, Streeley Village, Nottingham NG8 6PD.
Tel: 0602 295019

Setting it up

Setting up the hardware and software is simple. The expansion card fits into any computer with a standard podule backplane, but will not fit into the A3010, A3020 or A4000 series machines.

The card then connects to the I/O unit via a single cable. Software consists of a single application that provides Midi file playback, sound sample playback and access to the synthesiser's instruments.

Installing the software is a simple job of just dragging the application from the floppy disk provided on to your hard disk. The software can be run from floppy for those without hard disks, but things are simpler if you have one.

Sound sample can often take up quite a bit of memory and it is likely that a hard disk will be a necessity when the sound-sampling option becomes available.

Double-clicking on the SuperSound application brings up a single window from which the various parts of the SSES 1600 can be controlled. The window is divided into three

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sections: Making sounds, playing back Midi files and playing back sound samples.

If you have a keyboard fitted with Midi, you can connect it up to the I/O unit and play the SSES's sounds directly. If you don't have access to such equipment, you can call up a *soft* keyboard on-screen and play the notes using the mouse pointer. Any of the 128 different sounds can be selected including a whole collection of orchestral instruments and sound effects.

Using the SSES 1600 in this way means that you can only play one note at a time, so you miss the polyphonic capability of the synth. An external Midi keyboard, on the other hand will let you play up to 32 notes at once – even if you don't have that many fingers.

The keyboard window therefore, is only really meant as a way of trying out the different sounds and does not really provide an alternative to a real keyboard.

The second part of the main window is for Midi file playback. Dropping any Midi file on to this area will automatically stop any current sound and play the chosen tune. Pause and stop controls allow the current tune to be paused or stopped respectively, while a slider control allows the overall volume of the synthesiser to be altered.

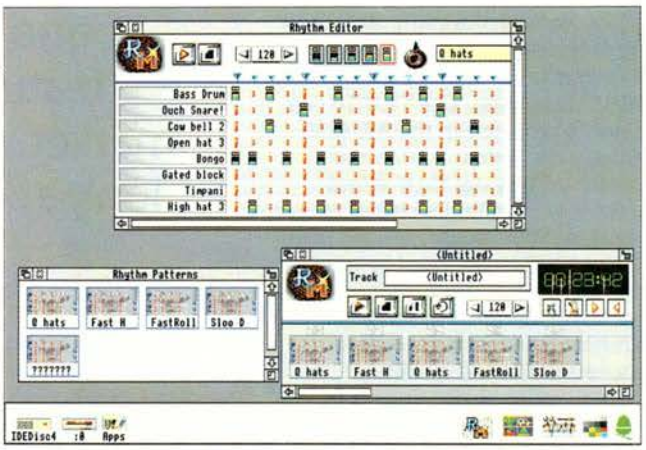
The SSES 1600 synthesiser is a 16-part, multi-timbral device. That is, it can play up to 16 different voices or sounds at once. This is different to the term *polyphonic* which means that more than one pitch – but with the same voice – can be played at the same time.

Using a special mixer window, the volume of each channel can be altered by means of a slider control. This allows you to *lower* instruments in the mix and is effectively like using a normal audio mixing desk.

The final part of the main window,

● *Create worlds for younger musicians*

● *Creating drum patterns with Rhythm Maker*



provides sound sample playback. Acorn RISC computers all have 8-bit sound which although adequate for games and simple music, is no match for 16-bit, CD quality sound used in compact disk players and professional environments such as studios. The SSES 1600 now allows you to play 16-bit samples directly from the Arc's memory.

At present this part is rather limited – you can only play sound samples using the SuperSound application – but in the near future ESP promise better integration with the Arc's existing sound system, to provide 16-bit playback from other applications such as Acorn's Replay.

Other *sound enhancers* such as Wild Vision's Eagle M2 card provide special drivers to allow third-party software to utilise the extra hardware and ESP will have to include these if this part of the SSES 1600 is to be of any real use.

Other software...

As I've already said, the SSES 1600 only comes with simple playback software at present. If you want to do anything clever, such as writing music, you're going to need to buy additional software such as a sequencing package, which is available from a variety of companies including ESP and Longman Logotron.

I tried the SSES 1600 with Clares' Serenade and Rhythm Bed, both of which performed well with the hardware. The SSES 1600's Midi interface complies fully with Acorn's Midi interface, so any software written to work with that should work with the board.

Summing up

My first impression on opening the packaging was one of apprehension. It's hard to guess just what a single card and small white box are capable of. After plugging in and running up the software, I can honestly say I was blown away.

The best way of appreciating the sound capabilities of the SSES 1600 is by comparing it to film. If you imagine the sound output from the Arc's speaker was an old 8mm cine film, then the output from the SSES 1600 is the latest, digital, SVHS video.

The demonstration Midi files supplied with the SSES 1600 include pieces of music in a number of styles ranging from Classical to Funk-Jazz. The beginning of Beethoven's 5th symphony was as dramatic as any proper recording and the big band number could have been the perfect backing for Old Blue Eyes. I also tried a few of the Midi files from the Serenade package and these gave equally stunning results.

If you're going to get the best out of the SSES 1600 it should be connected up to a decent hi-fi or a pair of active speakers – ESP can supply such speakers. Some of the sounds actually use stereo for effect – the helicopter in particular sounds incredible, as if it was circling overhead. Other, more traditional voices such as the Orchestra Hit use stereo to achieve a fuller sound.

The actual hardware used on the expansion card is similar to that used in the Ensoniq range of keyboards. These are real keyboards for professional musicians and cost anything between £1,400 and £2,500.

The sounds you get with the SSES 1600 are literally the same for a fraction of the cost. Of course, you don't get a keyboard or any sequencer, but these can be added to your system as you upgrade. The beauty of the SSES 1600 is that it can be upgraded in stages in the future.

£299 might appear a lot to pay to just improve the sound quality of your computer. The SSES 1600 does much more than that and builds the foundations of what is – and I'm sure what will be – a truly professional sound system for the Acorn range.

At present, there is no real alternative to the SSES 1600 and any other companies hoping to beat it are going to have to try extremely hard.

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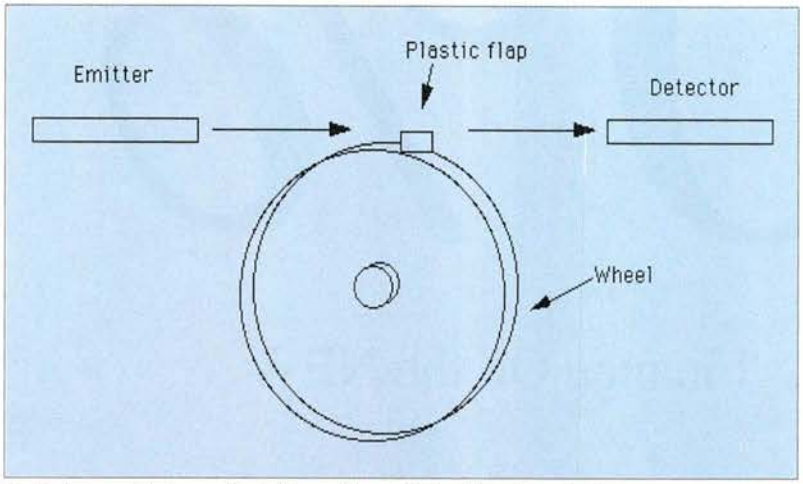


● *Gluing small pieces of plastic on the outside of the hamster's cage*

The hamster joins in

Mike Cook introduces another member of his household to Body Building

IN MY house all members of the household are roped in to help with Body Building projects. Well this time it was the hamster's turn to help, which maybe explains why he chose to escape just as I was about to start my experiments.

Nothing cruel you understand, but I thought it might be a good idea to look at the ways we could use our computer to monitor the movements of small animals. This can make a fascinating school project or even the start of your own research.

I know that in the past some of my interface projects have been used in animal behaviour research. One was used to monitor the hatching times of fruit flies and another to look at the daily movement cycle of edible snails.

The idea here was that the researchers were looking for quiet times so that they could alter the biological clock making the snail think a day was much shorter. In that way they hoped to rear snails more quickly. Needless to say these were not for English consumption, on this occasion it was the Greeks.

I had noticed that the nocturnal habits of Shadow, our pet hamster, were quite strange. So much so that he had been passed from Graham to Alec because Shadow's cage-chewing habits kept Graham awake at night.

I thought it might be interesting to see just what activity Shadow showed. However, the techniques are not confined to hamsters but can be modified to cope with anything from insects to small mammals.

Computers are a godsend for those interested in monitoring animal activity. All that data can be taken slowly and steadily over long periods, dumped to disk and analysed. With the advent of a multitasking desktop you needn't lose the computer to this task.

However, you must be careful not to use an application that will crash or cause the computer to reset otherwise you will loose your data as well. You are not so much interested in detecting every movement of the creature but rather the times of major activity.

The trick here is to match your sensor to your subject and the question you want to answer. For example, does a goldfish take a nap, or how many miles can a hamster run in a week? Not only do you have to do this but you also have to make sure that your sensor does no harm to the subject and the subject does no harm to your sensor.

Well, let's look at the hamster problem first. A fairly simple sort of monitor could be made to detect the movements of the exercise wheel. This of course depends on whether you have a hamster that is partial to using it.

The two we had before Shadow would never go near the thing and I was beginning to think they were just a con foisted on us by pet shop owners. However, Shadow really gave the exercise wheel some hammer, so much so that monitoring its time of use or maximum speed might make a very interesting project.

This is basically a tachometer

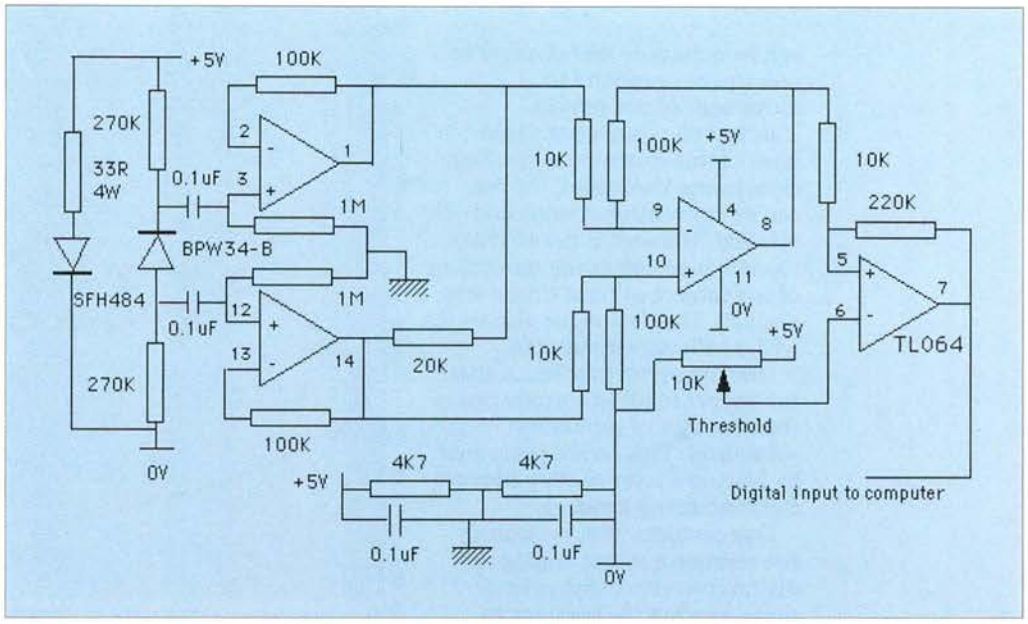
problem, where we need to get the wheel to feed us a pulse at least once every revolution. I think this is best done by using a reflecting opto-switch with strips of foil glued on the outside of the wheel. However, these are designed to work at a distance of a few centimetres, so this would mean mounting the electronics inside the cage.

Now, if your hamster is anything like ours this means that it would get severely chewed, not much damage to the hamster but it could get expensive. Therefore I decided to adopt the direct approach and have an infra-red beam across the cage. In that way all the electronics would be out of gnawing range.

In order to make the wheel break the beam when it was turning I glued a small piece of plastic on the outside of the wheel. The sensor and emitter were both placed in the end of long cardboard tubes. This was to shield the sensor from external light and to prevent the light from spilling out.

As the distance between the emitter and sensor was a little long I had to resort to an amplifier at the sensor end. Note here that this is an AC-coupled amplifier because we are only really interested in movement and it also helped prevent any slow-changing background light interfering with the measurements.

All you need here is a digital input to your computer to perform the monitoring. This could come from a User Port, IIC interface or even the busy line of any printer port.



● *All you need is a digital input to your computer to perform the monitoring*

Monitoring a goldfish using the same technique could be done but it is a little trickier. This is one area where I have not actually conducted any experiments but an initial idea might be to set up a beam across the tank.

To cover more of the area you could arrange for mirrors, either inside the water or stuck on the outside of the tank, to bounce the light around the tank. This could be tricky to set up but would be quite effective.

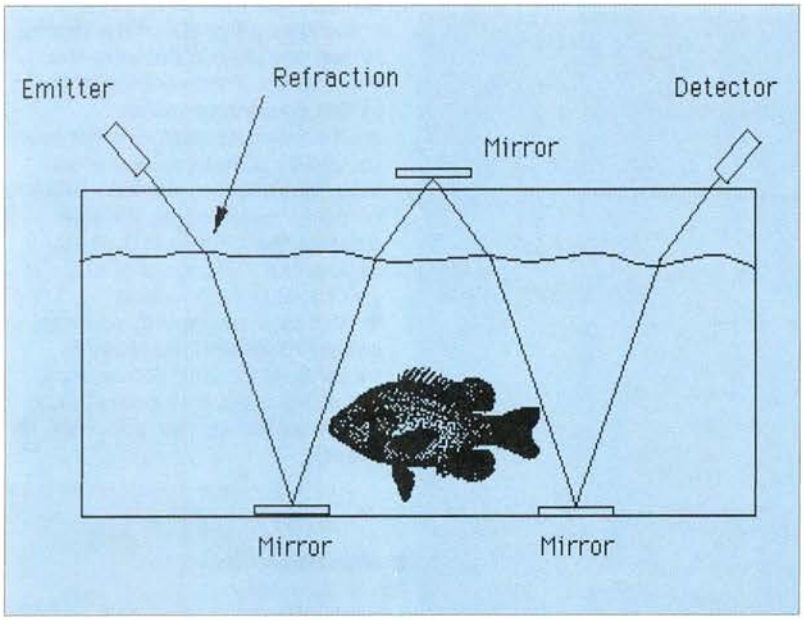
Remember however, that when light enters the water it is refracted as the water acts like a prism. This will need compensating for when you make your setup.

Coming back to dry land I have found that the most effective movement monitoring is made by using conducting bedding. What's more, making bedding is perhaps the only use you can make of those personal paper shredders that seem like such a good idea in a catalogue.

The idea is that you get some paper and scribble heavily on both sides, making sure that you cover the paper thoroughly and leave no white showing. It is best to use a soft pencil for this, but nevertheless it is a bit of a messy business. Take the paper and put it through a shredder, or failing that cut it up into long thin strips and crunch it up.

Now we have to put this on a piece of Veroboard that has been wired up with every alternate track connected together. The idea is that the paper lies on top of the copper strips and some of the paper bedding makes an electrical contact across these strips.

If we monitor the resistance of this contact with our computer we



● *Arrange for mirrors in the water or outside the tank to bounce the light around*

➤

can be quite sure that changes in resistance correspond to movement of our subject.

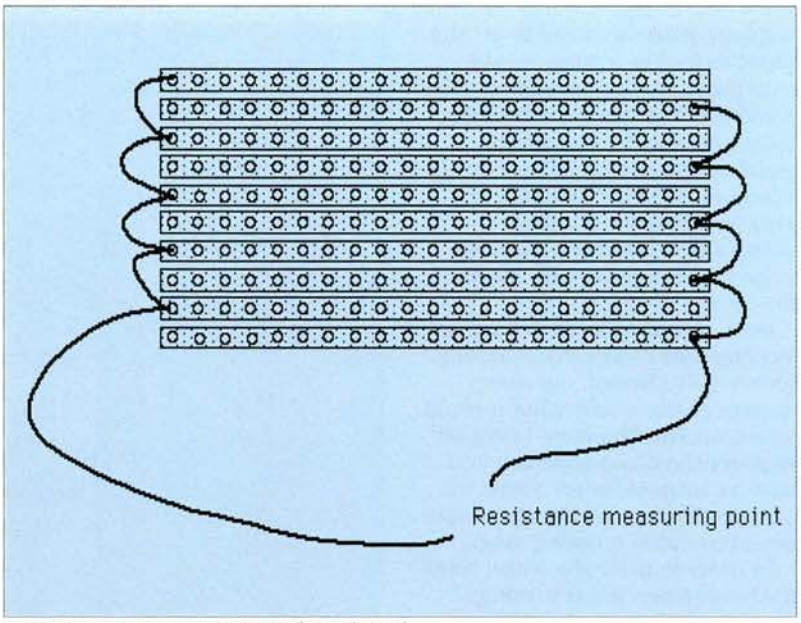
In fact you only need a thin layer of this conducting bedding close to the Veroboard, the rest can be conventional straw and sawdust. The trick is not to have too much on top or the movement of our subject will not trigger any changes. This technique also works well, I believe, with insects.

One long-term problem is that the copper tends to corrode under the influence of certain wet substances. This can be prevented by placing a layer of cling film over the conducting bedding.

One problem with measuring the resistance is that analogue to digital converters always have noise, causing the readings to change even in the absence of any resistance change.

Fortunately, this is easily coped with by software. The idea is that you take the difference between the current reading and the last one. To detect movement all you need to do is to see if that difference is above some threshold. Measuring resistance can be done easily, however it could be that in your arrangement your subject is too light to make a measurable change.

In that case you can always use an amplifier again, being AC coupled it should be almost self-adjusting. The only snag with this type of monitoring is that you need an analogue input port, this could be the joystick port or the analogue input of an IIC device.



● *How to wire up your piece of Veroboard*

One point about the software is that you have to consider what you want to measure. Normally you will need to take samples at a slow rate if you are not going to swamp yourself with data.

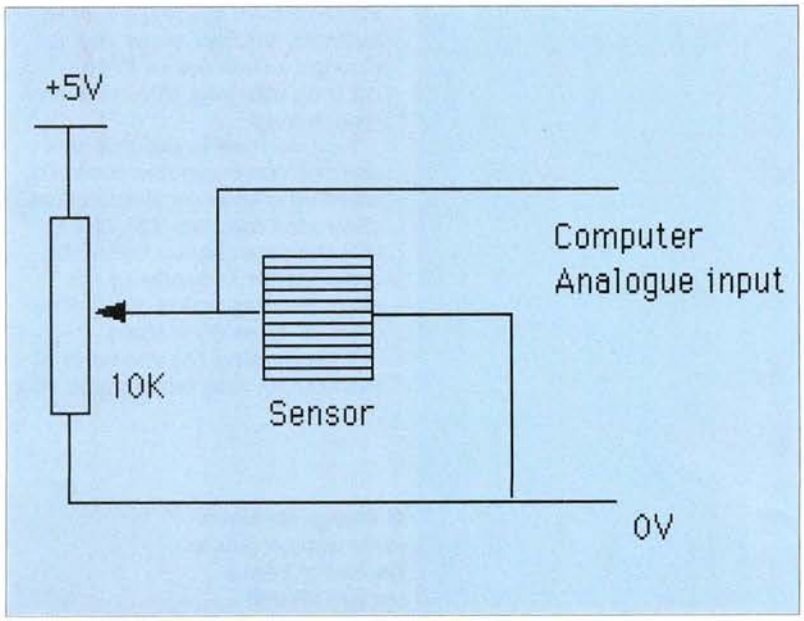
Recording one floating point number every minute will give you about 12k of data per day. However, you don't just want to sample the circuit once a minute as you could easily miss something.

Therefore, what you want is two rates, one to record if any movement has been made in that period and the other to look at the sensors. There are many formats you can choose from but the one I have found most useful is to sample every second and count each time a movement is detected. Then every minute record a byte of these counts.

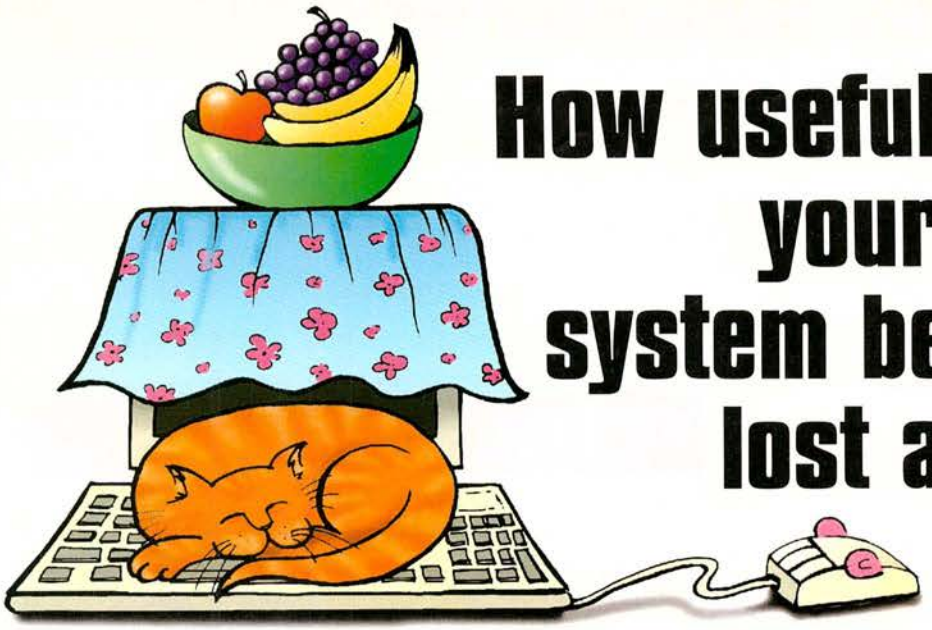
In case the computer does not let your program get a look-in every second, what you record is not the count but a normalised count. That is simply the number movements detected divided by the number of times you have looked. If you see movement every time this will be 1, otherwise it will be some decimal number less than 1.

Another point about the timing is that you should not alter the value of the Time variable in Basic, as this could upset other multitasking programs. What you should do is make a copy of its value in your own variable, add a constant representing the time delay to this copy and then test it against the Time variable to see if you should take a sample.

● *Well there you have it, your own animal behaviour laboratory.* As someone once said, Behavioural science is just a matter of pulling habits out of rats. See you next month.



● *Measuring resistance can be done easily using this circuit*



How useful would your Acorn system be if you lost all your data?

These days a hard disc is considered mandatory for the majority of computer users. The convenience and speed of having all your programmes and data stored together is unquestioned.

But have you ever stopped to consider the dire consequences of losing some or all of the files on your hard disc? Perhaps you or another user accidentally deletes some data, or a small but vital file has become fatally corrupted. Hopefully not a common scenario but, nonetheless, a nightmare you can well do without.

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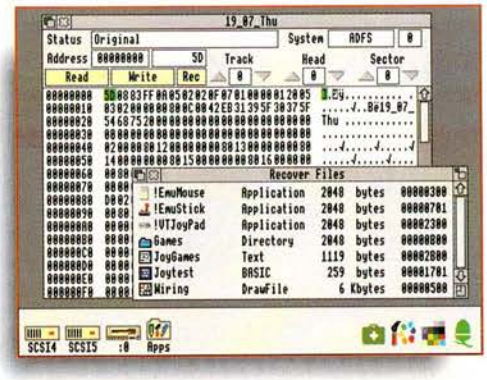

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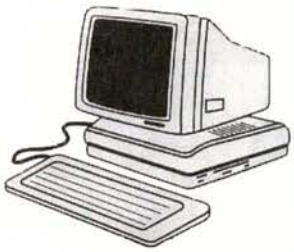

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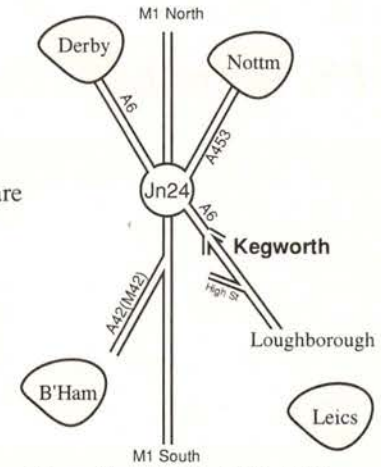

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• A3020 2Mb FD	–	£639	£689	£769
• A3020 2Mb HD60	–	£759	£809	£889
• A4000 2Mb HD105	–	£829	£879	£959
• A5000 2Mb HD80	–	–	£1199	£1279
• A5000 4Mb HD210	–	–	£1399	£1479
• A4 Notebook 2Mb FD	£1289			
• A4 Notebook 4Mb HD	£1529			

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• PocketBook Class (10) Pack	£1699
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• Parallel Link	£25
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• 256K Flash Disc	£59
• 512K Flash Disc	£85
• Mains Adaptor	£12
• Schedule	£19
• Plotter	£29

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• A310 to 2Mb RAM Upgrade	£89
• A310 to 4Mb RAM Upgrade	£179
• A3000 to 2Mb RAM Upgrade	£29
• A3000 to 4Mb RAM Upgrade	£99
• A410/1 to 2Mb RAM Upgrade	£35
• A410/1 to 4Mb RAM Upgrade	£105
• A420/1 to 4Mb RAM Upgrade	£70
• A3010 to 2Mb RAM Upgrade	£39
• A3020/4000 to 4Mb RAM Upgrade	£70
• A5000 to 4Mb RAM Upgrade	£79
• A5000 to 8Mb RAM upgrade	£359
• A540 4Mb RAM Upgrade	£249

A310 upgrades are dealer fit only – we will collect, fit, deliver computer back for £24

Arc to BBC/Serial Link

Using this simple transfer link, you can transfer all your data from your BBC micro to your Archimedes. The kit is supplied with software and a connecting cable.

• RISC OS 2 version	£15
• RISC OS 3 version	£16

On-site Warranties

• A3010, A3020, A4000 1yr On-site	£25
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• A3020 HD and A4000 3yr On-site	£51
• A5000 all models 3yr On-site	£68

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The upgrade can be fitted by the user into an A300 or A400 series machine, but for A3000 owners, the ARM3 has to be fitted by ourselves. We will collect, fit and return your A3000 to you at an additional cost of £21.
Owners of A300 series and old A440 models will need a MEMC1A upgrade to use the ARM3.

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• Bulk Software (10) Pack	£319

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- Power save mode on supported drives

A300/A400 Internal IDE Drives

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ADA 2000	170Mb	13mS	£239
ADA 2010	250Mb	13mS	£289
ADA 0580	330Mb	16mS	£359
ADA 2030	420Mb	13mS	£469

All above upgrades are supplied complete with drive, controller card, cable, software and easy-to-follow instructions.

A5000 Internal IDE Drives

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ADA 2040	170Mb	13mS	£179
ADA 2050	250Mb	13mS	£199
ADA 0880	330Mb	16mS	£239
ADA 2060	420Mb	13mS	£309

A3000 External IDE Drives

Part No.	Capacity	Access Time	Price
ADA 2070	170Mb	13mS	£289
ADA 2080	250Mb	13mS	£379

A3000 Internal IDE Drives

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ADA 0720	80Mb	18mS	£199
ADA 0730	120Mb	18mS	£259
ADA 1080	200Mb	18mS	£389
ADA 2090	340Mb	16mS	£509

A300/400 Series IDE Hard Cards

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ADA 0890	60Mb	18mS	£169
ADA 0670	80Mb	18mS	£209
ADA 0680	120Mb	18mS	£249
ADA 1090	200Mb	18mS	£379
ADA 2100	340Mb	16mS	£499

Accessories

• A300/400 IDE Interface (16-bit)	£79
• A3000 Internal IDE Interface (8-bit)	£85
• A5000 2nd Drive Adaptor Kit	£10
• External Case & PSU for A3000	£59
• ROM Upgrade for use with RISC OS 3	£16

(only required if DEFS module is less than version 2.10)

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I/O Expansion Cards

- A3000 User Port/MIDI card £44
- A3000 Analogue/User card £35
- I/O Podule - User/Ana/1MHz £79
- Archi Analogue/User card £55

Disc Controllers

- Floppy Disc Interface £21
- Backplate/Lead for above £12
- 8-bit SCSI card £120
- 16-bit SCSI card £149
- 16-bit SCSI card – Acorn £249
- ST506 Hard Disc podule £69

Ultimate Expansion

- Ultimate Expansion – A5000 £39
- Ultimate Expansion – A3000 £39
- Ultimate Expansion – A3010 £41
- Ultimate Expansion – A3020 £38
- SCSI uPodule £69
- Vision Digitiser uPodule £79
- Analogue uPodule £29
- Serial Port uPodule £49
- MIDI uPodule £49
- Scanlight 256 uPodule £229
- PSU Kit for Ultimate Exp. £30

(please call for pricing of above cards with IDE hard drives fitted)

Graphics Cards

- Colour Card Gold £239
- Mono Real-time Digitiser £75
- Chroma 500 Genlock card £419
- Chroma 150 PAL Encoder £169
- Chroma Genlock card £209
- Hawk V8 MKII Digitiser £189
- Eagle M2 Multimedia card £275
- HiVision Colour Digitiser £149

Scanners

- Spectra Colour Handscanner £549
- Scanlight 256 – A300/400 £188
- Scanlight 256 – A3000 £198
- Scanlight Professional £549
- Scanlight Video 256 £199

Networking

- Ethernet card – A300/400 £139
- Ethernet card – A3000 £189
- Econet Module – A300/400 £49
- Econet Module – A3020 £49
- Econet Module – A4 £49
- Ethernet III card £149
- Acorn Access – A3000 £145
- Acorn Access – A3020 £145
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- TCP/IP Protocol suite £399

Miscellaneous Add-

- Floating Point Accelerator £99
- 386 1Mb PC Card – A3020 £225
- 486 4Mb PC Card – A3020 £420
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- A300/400 Dustcover £9
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- A3000 Monitor Stand (Acorn) £29
- A3000 Monitor Stand (WE) £15
- A3000 Podule Case £15
- A3000 Carry Case £10
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- A4 Notebook Battery Pack £49
- A4 Notebook Mains Adaptor £69
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- Replacement Mouse (Acorn) £39
- Archi MK4 Replacement Mouse £29
- Quest Tracerball £26
- Mouse Port Splitter £10
- Voltmace Delta Cat Joystick £25

Concept Keyboards

- A4 Standard keyboard £89
- A3 Standard keyboard £95
- A4 Primary keyboard £94
- A3 Primary keyboard £99
- A4 Designer keyboard £104
- A3 Designer keyboard £104
- Universal 2010 keyboard A4 £104
- Universal 2010 keyboard A3 £107
- User Port cable for 2010 keyboard £9
- Arc Serial cable for 2010 keyboard £9
- Concept Designer software £22

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Features include:

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- Selectable scanning modes
- 105mm scanning width
- Ability to shear and rotate the image

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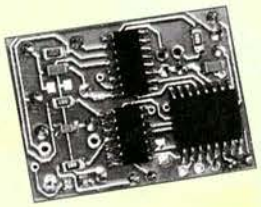
- Scan256 for A3000 (external) £169 *(ring for availability)*

Note: Scan256 is not suitable for A3010/A3020 or A4000 computers.

VIDC Enhancer



The Watford VIDC Enhancer for the Archimedes 300/400 and A3000 computers, caters for all types of Multiscan and VGA monitors.
A disc of utilities is supplied to allow you to define your own modes, and change existing ones. A desktop mode selector is also supplied

- Multiscan VIDC Enhancer £19
- SuperVGA VIDC Enhancer £35
- 9 to 15 pin VGA Adaptor £12

Archi Hand Scanner

Watford's MKII hand scanner for the Archimedes and A3000 has a maximum resolution of 400dpi, and a scan width of 4". The software is supplied on ROM, so there are no discs to load. Features include: cropping and scaling images, X flip and Y flip, and edge detection allows you to transform solid images into outlines.

- A300/400/A5000 version £79
- A3000 external version £99
- v1.10 ROM Upgrade £20

Archi A4 Scanner

The 216mm scanning width can cope with both desktop scanning of single sheets, photographs, etc, with its detachable sheet feeder, or used as an A4 wide hand scanner. 64 grey levels are produced from the scanner at resolutions up to 400dpi. The software included on ROM allows you to adjust contrast and brightness of the scanned image, rotate, shear and cut out sections of the image. The scanner uses a green light source which gives improved contrast on images over conventional red light scanners.

- A4 Scanner for A300/A400 £179
- A4 Scanner for A3000 £199
- Sheet Feeder for A4 Scanner £69

Archimedes Spares

- Cased Archimedes Keyboard £99
- A3000 Replacement Keyboard £35
- A300/A400 Power Supply £79
- A3000 Power Supply £59
- Fan Filter £4
- A5000 3.5" Floppy Drive £69
- A3000/A400 3.5" Floppy Drive £59
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- Multimedia Expansion – 8 bit £559
- Multimedia Expansion – 16 bit £579

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CD ROM Software

Artworks	£165
Artworks Clip Art	£19
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CD Francais	£120
Creepy Crawlies	£90
Dictionary of Living World	£175
Dinosaurs	£124
Grooves	£90
Hutchinson Encyclopaedia	£49
Illustrated Holy Bible	£23
Illustrated Shakespeare	£23
Image Warehouse	£53
Revelation II	£98
Sherlock Holmes	£23
Space Encyclopaedia	£57
Really Useful CD v1	£47
Really Useful CD v2	£47
Times & Sunday Times	£195
Woodland	£144
Pro Artisan v2	£109

ARCHIMEDES SOFTWARE

Below are listed the more popular software titles for the Archimedes, if you cannot see the title that you require, please call for price and availability.

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10 out of 10 Early Essentials	£18
10 out of 10 Junior Essentials	£18
10 out of 10 Maths - Number	£18
10 out of 10 Maths - Algebra	£18
10 out of 10 Maths - Statistics	£18
10 out of 10 English	£18
10 out of 10 French	£18
10 out of 10 Dinosaurs	£18
10 out of 10 Driving Test	£18
Advantage	£32
Animal Rescue	£22
Animated Alphabet	£18
Animated Numbers	£18
An Eye for Spelling	£31
Arcventure I – Romans	£24
Arcventure II – Egyptians	£24
Arcventure III – Vikings	£24
Around the World in 80 Days	£TBA
Aztecs	£37
Badger Trails	£34
Best Four Adventure	£34
Best Four Language	£34
Best Four Maths	£34
Body	£17
Bookbinder	£43
Bookstore – Primary	£35
Bookstore –Secondary	£52
Britain since 1930	£26
Bumper Disc 1	£14
Bumper Disc 2	£14
Circus	£14
Concept Keyboard Designer	£22
Connections	£27
Concept Kids	£21
Converta Key	£9
Crystal Rain Forest	£34
Desktop Stories	£35
Dream Time	£19
Export, Trade and Industry	£34
First Page	£39
First Logo	£20
Farm (5-7 years)	£18
Fleet Street Phantom	£22
Food for Thought	£17
Fun School 3 Blue (under 5)	£17
Fun School 3 Red (5-7 years)	£17
Fun School 3 Green (over 7)	£17
Fun School 4 Red (under 5)	£17
Fun School 4 Green (5-7 yrs)	£17
Fun School 4 Blue (over 7)	£17
Geordie Racer	£24
Glimpse	£8
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Hilighter	£30
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Investigating Maths	£34
Jigsaw	£18
Landmarks – Aztec	£17
Landmarks – Civil War	£17
Landmarks – Columbus	£17
Landmarks – Egypt	£17
Landmarks – Elizabeth I	£17
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Landmarks – Tudors & Stuarts	£17
Landmarks – Victorians	£17
Landmarks – World War II	£17
Linkword – French	£32
Linkword – German	£32
Linkword – Spanish	£32
Magpie	£58
Making of the UK	£35
Mapping Skills	£25
Mapventure	£22
Medieval Realms	£35
Microbugs	£24
Nature Park Adventure	£24
Naughty Stories vol.I	£48
Naughty Stories vol.2	£48
Numerator	£33
Picture Book	£14
Podd	£23
Recall	£36
Seelinks – Ourselves	£26
Seelinks – Pondwatch	£34
Seelinks – Tourism	£54
Seelinks – Transport	£34
Selladore Tales	£23
Settlement	£30
Snippet	£31
Space Mission Mada	£22
Splash	£18
Stig of the Dump	£21
Story Starts	£24
Talking Pendown	£59
Teachers Cupboard	£24
Teddy Bears Picnic	£22
Topographer	£62
Victorians	£19
Viewpoints	£33
Wizards Revenge	£16
World Maker	£46
World Map Study	£59
Worst Witch	£21

Games

Adventures of Sylvia Lane	£19
Air Supremacy	£13
Apocalypse	£14
Arcade 3 Compilation	£11
Battle Chess	£21
Birds of War	**£25**
Black Angel	£23
Boogie Buggie	£14
Break 147 & Superpool	£24
Bug Hunter in Space	£9
Carnage Inc.	**£20**
Cataclysm	£15
Champions Compilation	£21
Chess 3D	£14
Chocks Away Compendium	£26
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Elite	£31
Enter the Realm	£17
E-Type Compendium	£17
E-Type Extra 100 Miles	£12
Fervour	£18
F.R.E.D.	**£17**
Galactic Dan	£14
Games Wizard	£17
Gods	£18
Grevious Bodily Arm	£14
Haunted House	**£20**
Heimdall	£24
Hero Quest	£21
Holed Out Compendium	£12
Interdictor 2	£22
Ixion	£22
Jahangir Khan Squash	£19
James Pond	£18
James Pond 2 - Robocod	**£21**
Lemmings	£18
Lemmings 2 - Tribes	**£24**
Lotus Turbo Challenge II	£18
Mad Professor Mariati	£14
Magic Pockets	£22
Master Break	£13
Man at Arms	£14
Manchester Utd in Europe	£18
Nebulus	£18
Oh No! More Lemmings	£14
Omar Sharif's Bridge	£18
Pandora's Box	£17
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Data Word	£14
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Acorn Desktop Assembler	£118
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RiscBASIC Compiler v3.0	£66
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Site Licences

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Artworks	£540
Impression Style	£435
Impression II	£542
Ovation DTP	£475
Pinpoint	£379
Pipedream 4	£695
S-Base	£399

Watford Electronics offer you the best selection of software for the Archimedes, and the best prices around. Make us your first and only choice.

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Euclid 2	£59
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GraphBox Professional	£102
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Poster	£74
Presenter GTI	£65
PrimeArt	£46
Pro Artisan 2	**£99**
Render Bender II	£89
Rephorm	£49
Revelation II	£74
Revelation Image Pro	£125
Solida Render v5.1	£75
Titler	£114

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Arc PCB v1.7	£79
Arc PCB Professional v3.2	£169
Arc PCB Schematics v5.1	£229
CADet	£125
SolidCAD v5.1	£65
SolidTools v5.1	£169
PowerRouter	£129
Excellon Drill	£53
Oak Parametric Design Tool	£149
WordCAD	£69

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Business Accounts System	£275
Business Accounts Modules	£85
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Micro Trader Modules	£75
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ArcComm 2	£38
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Rhapsody 2	£45
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Notelle	£57
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Home Office

Includes Pipedream 4, PC Emulator with DR DOS v6, Datapower database software and some demonstration versions of popular software packages. **£85**

Learning Curve

Includes Acorn Advance, PC Emulator with DR DOS v6, together with some demonstration versions of popular software packages. **£42**

Printer Drivers

Expression PS	£19
Citizen Colour Driver - OS 2	£15
Deskjet 500C/550C Driver	£15
Epson JX Printer Driver	£15
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TurboDriver - Canon BJ	£39
TurboDriver - Epson Stylus	£39
TurboDriver - HP	£39
Repro	£49

Fonts

RISC User Font Pack 1	£10
RISC User Font Pack 2	£10
RISC User Font Pack 3	£10

Books

!Help 3 - RISC OS 3	£10
!Help - Draw	£16
Archimedes Assembly Lang.	£15
Archimedes Operating Syst.	£15
A3000 Technical Manual	£29
A5000 Technical Manual	£65
A3010/A4000 Technical Manual	£30
A540 Technical Manual	£65
A4 Technical Manual	£65
A4 Portable Handbook	£7
A4 Welcome Guide	£10
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Good Impressions	£25
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Impression II - Dabhand Guide	£15
Mastering 1st Word Plus	£14
RISC OS Style Guide	£10
RISC OS 2 Prog. Ref. Man.	£79
RISC OS 3 Prog. Ref. Man.	£99
RISC OS 3 Apps/User Gd.	£20
RISC OS 3 First Steps	**£15**
Wimp Prog. for All	£13

ACORN TO PC

Unravel the difference between DBC O3 and DC8 with this easy to understand guide

Only £7.50

SOFTWARE OFFERS

• Acorn DTP	£20
• 1st Word Plus	£15
• Lemmings	£10
• Quest for Gold (HD)	£5
• Pacmania	£9
• Genesis	£15

The Bestsellers

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'The most sophisticated DTP package available for under £100.'

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'The best graphics manipulation package available.'

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'The ultimate integrated package that really works for you.'

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Prophet Accounts ***£131***
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Software Bundles

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  Romans, Egyptians, Vikings
- **Linkword** **£87**
  French, German, Spanish
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- **Crystal Maze &** **£44**
  Games Wizard
- **Artworks &** **£119**
  Clip Art CD
- **Impression II &** **£130**
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- **PC Emulator &** **£155**
  Acorn Advance
- **Ovation & Thesaurus** **£69**

Sales Hotline
0582 745555

Despite appearances, we offer you very little choice.

At **Watford Electronics,** we will only offer any product when we are convinced that we can sell it at the best price with the right level of support. It's an approach that our thousands of customers appreciate, for we are now celebrating twenty-one years in the business. So as you look through all the lists of items that follow and discover how competitive we are, you'll discover just how little choice you have. **You simply must call us.**

Laser Printers

All Laser printers (excluding HP Lasers) include 12 Months On-Site maintenance

Brother HL6	6ppm	£422
Brother HL6V	6ppm	£465
Canon LBP4+ 1.5M RAM	4ppm	£635
Canon LBP4U	4ppm	£485
Canon LBP-8 Plus IIIR	8ppm	£1559
Canon LBP-8 IV 600DPI	8ppm	£925
Epson EPL5000	6ppm	£433
Epson EPL-5200	6ppm	£483
Epson EPL-7500 PS	6ppm	£1135
HP Laserjet 4 ML	4ppm	£745
HP Laserjet 4	8ppm	£960
HP Laserjet 4L	4ppm	£469
HP Laserjet 4M	8ppm	£1286
HP Laserjet 4P	4ppm	£717
HP Laserjet 4MP	4ppm	£979
HP Laserjet 4Si	16ppm	£2175
HP Laserjet 4SiMX	16ppm	£3260
NEC 610 Super Script	6ppm	£422
NEC Silentwriter S102	6ppm	£914
NEC Silentwriter S102P PS	6ppm	£1284
OKI OL400EX	4ppm	£385
OKI OL410EX	4ppm	£523
OKI OL 830PS	8ppm	£799
Panasonic KX-P4400	4ppm	£360
Panasonic KX-P4410	5ppm*	£424
Panasonic KX-P4430	5ppm*	£530
Panasonic KX-P4440	10ppm*	£779
Panasonic KX-P5400 PS	4ppm	£599
Star LS-5	5ppm	£442
Star LS-5 EX (RISC Based)	5ppm	£510
Star LS-5 TT True Type+Mac	5ppm	£732

*2 years on-site warranty

Laser Toners

Canon 2, 3 & 4	£52	KX-P4400/5400	£12
Canon LBP4U	£52	KX-P4450/50i/55	£19
Canon 8/Star LP8	£52	KX-P4410/20/30	£29
Canon LBP8-IV	£65	NEC 290	£78
Epson GQ	£14	NEC S60/60P/62P	£89
EPL 40/41/4300	£63	OKI OL400/800	£19
EPL 5200	£85	OKI OL400e	£17
EPL 71/7500	£117	Star LP4	£48
HPII/D, III/D	£52	Star LS5	£63
HP IIP, IIIP	£46	VM800 8K pages	£99
HP4/4M	£70	Qume Crystal(3)	£99
HP Laserjet 4L	£45		

Laser RAM Upgrades

Type	1M	2M	4M	8M
HPIIP; III/P/D	£54	£90	£132	
HPII & IID	£65	£110	£175	
HPIIIsi	£63	£85	£158	£299
LJ4/4L//4M	£65	£85	£150	£299
EPL40/41/4300	£70	£110	£205	
EPL 50/5200	£58	£115	£215	
KX4410/30	£70	£110	£199	
KX4420/50i	£65	£89	£149	
KX4400	£89	£129	£239	

Jetpage Postscript Cartridge

- HP IIP/IIIP £225
- IID & III £227

Various Add-Ons

- HP Premier Font Collection £19
- Laserjet Various Font C'tridges from £45
- HP Postscript Module for LJ4 £270
- Laserjet 4 Powered envelope feeder £199
- Jetdirect Ethernet Card for Laserjet IIIsi/4/4Si £339
- 500 Sheet paper cassette (3rd Bin) £205
- HPIIP/IIIP Lower Cassette Tray £115
- Canon LBP-4 Lower Cassette Tray £96
- Ozone Filter P4420 £9; P4450/55 £20

Panasonic Printers

	Printer	CSF	Ribbon
KX-P1170	£91	£59	£6
KX-P1624	£210	£126	£8
KX-P1695	£267	£126	£6
KX-P2023	£122	£155	£8
KX-P2123M	£132	£69	£7
KX-P2124	£210	£89	£7
KX-P2624	£255#	£126	£8

#Includes 12 months on-site warranty

- Colour Kit for KX-P2180; KX-P2123 and KX-P2124 £30
- Dustcover for 80 column printers £6
- Serial Interface for above Printers £46
- Black Ribbons for P1081, 1180, 1124 £7
- 32K Buffer for above Printers £16

P.S. Our original Panasonic Ribbons are guaranteed to last 3 million characters.

Canon Bubblejet Printers

	Printer	CSF	2nd Bin	Ink Cart
BJ10SX	£154	£43	–	£15
BJ200	£202	–	–	£16
BJ230	£276	–	–	£16
BJ300*	£322	£88	£88	£11
BJ330*	£372	£92	£79	£11
BJC600	£418	–	–	£7.50
BJC800	£1075	–	–	£16

Black Cart. for: BJC600 £6; BJC800 £13

- Optional Battery Pack for BJ10EX/SX £33
- BJ10E/10EX/10SX/200/230 Jumbo Ink Refill pack (twice cartridge volume) £12

* includes 12 months on site warranty

Citizen Printers

120D+ parallel	£90	Swift 90C	£122
120D+ Serial	£109	Swift 200	£142
ABC 24pin Mono	£115	Swift 200C	£156
ABC 24pin Col.	£135	Swift 240	£170
Swift 90	£115	Swift 240C#	£187

2 years warranty on Citizen Printers.

FREE Windows Printer Driver

- Swift 24 Ribbons: Black £4 Colour £13
- Cut Sheet Feeder for 80 col. printers £75
- Citizen 120D Ribbons £3.50

Star Printers

	Printer	CSF	Ribbon
LC15	£179	£135	£5
LC100C	£103	£65	£9
LC24-15 Mk2	£240	£135	£5
LC24-20	£170	£–	£–
LC24-30C	£169	£–	£–
LC24-100	£130	£69	£5
LC24-300C	£224	£–	£–
LC24-20 Mk2	£173	£65	£5
LC24-200C	£200	£65	£12
LC200 C	£147	£65	£12
SJ144 colour	£345	£–	£–
XB24-200C	£320#	£80	£12
XB24-250C	£385#	£139	£12

Includes 12 months on-site warranty

- Black Ribbons for Colour Printers £5
- Serial 8K I'face LC10/15/24/200 £52
- 32K Buffer LC/XB24-10; 15; 200 £52

Scanners

AT – HP-ScanJet IIP £500; IIC £949
PS/2 – HP-ScanJet IIP £501; IIC £950
HP Auto Doc Feeder IIP £229; IIC £365
HP ScanJet II CX £689

Epson A4 Scanners: Supplied complete with Pic Publisher LE, Omni Direct OCR, Interface card & Cables

GTX6500P £535; GTX6500S £599
GTX8000P £699; GTX8000S £760

Epson Printers

	Printer	CSF	Ribbon
DFX5000C	£1095	£–	£23
FX870	£228	£47	£4
FX1170	£284	£69	£6
LQ100	£119	£–	£4
LQ570+	£189	£45	£4
LQ870	£335	£45	£6
LQ150 Col	£165	£–	£–
LQ1070	£285	£69	£6
LQ1170+	£404	–	£10
LQ2550	£667	£360	£6
LX100	£109	£–	£4
LX400	£91	£69	£4
LX850+	£134	£69	£4
LX1050	£174	£125	£6
SQ870	£415	£170	£23
SQ1170	£560	£155	£23
Stylus 300	£178	£–	£10
Stylus 800	£185	£–	£10
Stylus 1000	£344	£–	£10

Epson RS232 Interface

Standard £28; +8K Buffer £75

- LQ100 Tractor Feed £29
- FX850/LQ800/850 Tractor Feed £69
- FX/LQ1050 Tractor Feed £85
- LQ2500/2550 Tractor Feed £90
- Dustcovers for 80 col printers £6

NEC Printers

	Printer	CSF	Ribbon
P22Q	£134	£59	£6
P3Q	£–	£–	£–
P32Q	£245	£79	£6
P72	£386	£115	£8
P90	£562	£115	£8

- Black Ribbons P20; P32 £6
- Ribbons P60/70/P90 Black £8; Colr £14
- P60/70 Colour Option Kit £59
- CSF for P20 £59; P60 £89; P70 £89

Universal Printer Sharers

Connect up to 4 Micros to 1 printer or 4 Printers to 1 Micro with our combined, Sharer/Changer switch boxes.

Standard Low Cost Sharers

Connects	Serial	Parallel
2 to 1	£8	£9
3 to 1	£11	£12
4 to 1	£15	£16

Professional Sharer Units

Connects	Serial	Parallel
2 to 1	£12	£13
3 to 1	£15	£17
4 to 1	£24	£26

Auto Printer Sharer Switch

Connects	Serial	Centronics
2 to 1	£27	£29
4 to 1	£44	£45
8 to 1	–	£75

256K Multi Spooler

These Parallel Auto printer sharer switches have built-in 256K Buffer.

- 2 In / 2 out £99
- 4 In / 2 out £115
- 8 In / 1 out £149

(Cables for all printer switches are from £5 each please specify the type required when ordering.)

Compact Converter Unit

Serial to Parallel & Parallel to Serial £32

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Hewlett-Packard Printers

DJ310 Mono	£167	DJ1200C PS	£1373
DJ310 Col. Kit	£28	D-Writer 510	£189
DJ510	£189	D-Writer 500C	£235
DJ500C	£235	D-Writer 550C	£375
DJ550C	£346	Paintjet XL300+	£1630
DJ1200C	£1072	DJ Portable+CSF	£205

+ Includes 12 months on-site warranty
3 years on-site maintenance available as follows:

DeskJet & DeskWriter mono	£55
DeskJet & DeskWriter colour	£65

- Paintjet Cartridge Black £17; Colour £27
- DJ Portable CSF £49; Carrying Case £49

Desk Jet 500 Accessories

- Ink Cartridges Black £13; Colour £21
- High Capacity Ink Cartridges Black £20
- Ink refill Double Pack (JetFill) £10
- Ink refill High Capacity (JetFill) £13
- 256K RAM Cartridges 510/500C/550 £49
- Epson FX Emulation Cart.(500 mono) £45
- DJ 500/510/550 Dust Covers £6
- 636G 50 x Transparencies A4 £35
- 636J 50 x Glossy Paper A4 (also XL) £35
- 630Z 50 x Cut Sheet Paper A4 £15
- 500 Sheets A4 90gms Cartridge paper £7

Plug In Font Cartridges for DJ 500

22706B - Prestige, Elite, Line Draw £55
22706C - Letter Gothic & HP Line Draw £56
22707P - Proprint Emulation Cartridges £57

Fujitsu Printers

	Printer	CSF	Ribbon
B100 Inkjet	£146	£35	£14
B200 Inkjet	£209	£35	£14
DL1150	£209	£99	£6
DL1250	£309	–	–
VM600 Laser	£529	–	–
VM600E	£769	–	–

Roland Plotters

DXY1150	£575	DXY1250	£725
DXY1350	£939	DPX2600	£POA
Sketchmate A4	£335	A3	£449

Printer Labels

(On continuous fanfold backing sheet)

1,000 90 x 36mm (Single Row)	£4.50
1,000 90 x 36mm (Twin Row)	£4.60
1,000 90 x 49mm (Twin Row)	£4.95
1,000 102 x 36mm (Twin Row)	£4.70

Laser Printer Labels on A4 Sheets

2400 – 70 x 37mm (3 Rows x 8) £15.25

Listing Paper (Perforated)

- 1,000 Sheets 9.5" x 11" Fanfold £5.50
- 2,000 Sheets 9.5" x 11" Fanfold £8
- 1,000 Sheets 9.5" x 11" NCR 2 Part £21
- 1,000 Sheets 15" x 11" Fanfold £7.50
- 2,000 Sheets 15" x 11" Fanfold £11.50
- 1,000 Sheets true A4 Fanfold 70gms £9
- 2,000 A4 Fanfold Paper £15
- 500 Sheets A4 80gms Bond £2.50
- 500 Sheets A4 90gms Cartridge for Ink Jet/Laser printers £7

Printer Leads

- PC Parallel 2m £4; 5m £8; 10m £13
- 25pin D Male/Male 2m £4; 5m £8
- Centronics Double Ended 4' £5; 6' £6
- RS232 Leads Various £POA
- **PC Keyboard Extension lead coiled £5**

Microvitec Monitors

- Cub 1451 - 14" Medium Res for BBC £199
- Cub 3000 - 14" Medium Res for Arc £195
- Cub 1440 - 14" Multiscan for Arc £389
- Cub 1450 - 14" Multiscan for Arc £POA
- Touchtec 501 for BBC £239
- Touchtec 3000 for Arc £239

Acorn Monitors

- AKF30 14" Med Res RGB £199
- AKF40 14" Med Res RGB £199
- AKF52 14" Multiscan £249
- AKF50 14" Hi Res Multiscan £299

Multiscan Monitors

- Eizo T240i £483
- Eizo F340i-W £625
- Eizo F550i-W £899
- Eizo T560i-T £1345
- NEC 3FGe £459
- NEC 3V £355
- NEC 4FGe £499
- NEC 5FGe £773
- Panasonic TX-13MAB £629
- Philips 7CM3279 £295
- Philips 7CM5279 £242
- Philips 4CM4270 £289
- Taxan 787LR £219
- Taxan 788LR £259
- Taxan 789LR £289
- Taxan 795 Trinitron £489
- Taxan Ergo 580LR £349
- Taxan Ergo 685+ £619
- Taxan 875+ £729
- Taxan Ultra 1075LR £1449

Aries A-Scan Monitor

The new Aries A-Scan Pro multiscan monitor offers high-definition flicker-free display at a price that is affordable.

- 14" high resolution colour display
- 0.28mm dot pitch, non-glare tube
- 29KHz to 70KHz horiz. frequency
- Low radiation MPRII standard
- 1280 x 1024 non-interlaced
- complete with connecting cable

£249

Aries Monitors

Aries 6000 15" Monitor

- 15" high resolution colour display
- 0.28mm dot pitch, non-glare tube
- microprocessor control
- 29KHz to 70KHz horiz. frequency
- complete with connecting cable

£299

Aries 7000 17" Monitor

- 17" high resolution FST display
- 0.28mm dot pitch, non-glare tube
- 1280 x 1024 @ 70Hz (N/I)
- microprocessor control
- 29KHz to 70KHz horiz. frequency
- complete with connecting cable

£575

Aries 7500 17" Monitor

- 17" high resolution colour display
- 0.28mm dot pitch, non-glare tube
- 29KHz to 75KHz horiz. frequency
- front panel controls
- complete with connecting cable

£525

Note: the Super VGA VIDC Enhanced is required to use the above Aries monitors on an older Archimedes

BBC Software

- Logotron Logo (ROM) £43
- Numerator (ROM) £39
- Pendown (ROM) £32
- View 3.0 (ROM) £45
- ViewSheet (ROM) £36
- ViewStore (ROM) £36
- ViewSpell (ROM/80T Disc) £28
- InterWord (ROM) £36
- InterSheet (ROM) £37
- InterChart (ROM) £25
- InterBase (ROM) £45
- Mega3 - Word/Chart/Sheet £76
- SpellMaster (ROM) £42
- WordAid (ROM) £20
- View Printer Driver Generator £12
- View Printer Driver (ROM) £29
- Fun School 3 Under 5s (Disc) £17
- Fun School 3 5-7yrs (Disc) £17
- Fun School 3 Over 7s (Disc) £17
- Quest Paint (ROM/Disc) £23
- ConQuest (ROM) £20
- Quest Fonts (Disc) £10
- Quest integrex 132 Driver £15
- Wapping Editor (ROM/Disc) £35
- Wapping Art (Disc) £10
- Wapping Fonts #1 (40T Disc) £10
- Wapping Fonts #2 (80T Disc) £10
- AMX Super Art (ROM/Disc) £20
- AMX Stop Press (ROM/Disc) £12
- Page Fonts for Stop Press £13
- BASIC 2 (ROM) £22

BBC Accessories

- 32K Shadow RAM Card £39
- Solderless ROM Board £32
- 32K ROM/RAM Card £39
- 64K ROM/RAM Card £52
- 128K ROM/RAM Card £83
- Sideways ZIF Socket System £18
- 16K Static RAM for ROM/RAM £8
- 16K DRAM for ROM/RAM £10
- Battery Backup for ROM/RAM £3
- Read/Write switch for ROM/RAM £2
- Sideways RAM Utilities Disc £5
- AMX Mouse only £25
- Quest Mouse III £25
- Quest Tracerball £25
- Mouse Mat (Red, Green or Blue) £3
- Master Quad ROM Cartridge £14
- Data Duck £14
- Power Duck £8

Disc Filing Systems

- Watford 1772 DDFS Kit £39
- Acorn 1772 Single Density DFS £49
- Watford DFS ROM £16
- Acorn DNFS ROM £17
- Acorn ADFS ROM £25
- Disc Filling System Manual £6.95

BBC Books

- Advanced BBC User Guide £5
- Master 128 Ref Manual Pt. 1 £14
- Master 128 Ref Manual Pt. 2 £14
- Master Advanced Ref Manual £5
- Complete BBC User Handbook £10
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AGENDA

- Extended sampling
- Non-loading software
- Sync separators
- Using the I²C port
- Rom filing system
- RF modulation

Q I RECENTLY purchased an internal IDE interface and drive for my A3000 which made software such as Wordz usable. On the back of my computer I now have an IDE port and an I²C port. I assume the former is for a second hard drive, but what is the purpose of the latter? It is not even mentioned in the User Guide that accompanied the drive.

This mysterious *expansion* on the back of my computer is as yet unused and seems designed to make me feel as if I've still got an Electron.

Richard Blythe, Newquay, Cornwall

A *The I²C interface – pronounced eye squared cee – is a serial interface that is used in the computer for the real-time clock and parameter ram. As the software exists inside your machine to drive it, you can make use of it to drive other devices. Many devices may be chained to this interface to allow you to monitor and control external electronics.*

There are two commercial interfaces available for this that I know of. The first is from ICS and is called the Andi Odule. This gives you eight bits of digital input/output with LED indicators, as well as an analogue output and a four-channel analogue to digital converter.

The other system has the same capability but comes unboxed and is from Musbury Consultants at about half the price. It was the project I covered in my July to September 1991 Body Building articles and includes projects like a transistor curve tracer, capacity charger measure and brain surgeon game.

The whole series of articles are available as a monographed reprint for £2 from Musbury Consultants, 5 Helmshore Road, Haslingden BB4 4BG.

Longer samples

Q I have a BBC B issue 7 which I bought second-hand and added a Solidisk 256k expansion rom/ram board with the 4MHz processor. I decided to build a sound sampler for my BBC Micro and, using the sound sampler program from the Body Building article in the January 1986 issue, I found that it works perfectly but was lacking in memory.

I though that I would use the command *VDUREC to record all the VDUs and pass it into the 256k buffer. I have found this useful for animation.

When I tried it with the sound sampler it would not record the samples, although it did record the prompt at the bottom of the screen, which is not a lot of good. Do you know how to sample directly to and from this 256k buffer and so enable me to sample for much longer than the average two seconds?

R. Williams, Easthampstead, Berkshire

A *The Body Building sound sampler will give you about 5 to 20 seconds of sample time if you choose your digitising rates correctly. However, as you have gathered, it uses the screen memory space for storage only and writes directly to those memory locations.*

Therefore, it does not go though any

➤

Accessing roms

Q MY problem concerns accessing the rom filing system on a BBC B from switch on. I want to program an Eprom with a Basic program and have it auto-boot. I have succeeded in putting my program in Eprom and – with the header suggested in the Advanced User Guide – have loaded and run it using *ROM.

I would now like the program to run automatically from switch-on. I have tried numerous combinations of !Boot files, but I am unable to get the micro to enter the rom filing system.

Graham Hollins, Selly Oak, Birmingham

A *First use the start up options links on the keyboard to make the computer auto-boot on switch on. It searches for a !Boot file starting with the rom filing system. Just make sure that the !Boot file is a machine code program with a load and run address.*

Now what you want to do is to make this program insert the appropriate commands into the keyboard buffer to switch to the rom filing system and chain your program. As you have got this far I am sure you don't need me to be more specific.

However, if any other reader wants to do the same thing, then the Watford Eprom Programmer has an option to build an RFS-type eprom which sorts all the file formats out appropriately.

➤

VDU calls and so not unexpectedly altering them does nothing for you. The Model B can only address 64k of memory directly and so to make the Solidisk system work it has to page memory in small 8k lumps.

So it would in theory be possible to modify the original sampling software to store the samples in a paged environment like this. In practice, Solidisk were reluctant to tell people much about their hardware and so this renders the task somewhat impossible.

Solidisk – when they were in the Acorn market – did not have exactly the best reputation for reliability and robustness of design, so there's not much I can do.

You can write to Mike Cook c/o Acorn Computing, Europa House, Adlington Park, Macclesfield SK10 4NP.

He will answer any questions about difficulties you may be having with your machines, mainly those to do with hardware. If you want a personal reply ensure that you enclose an SAE with your letter.

Syncopated views

Q I RECENTLY built the Sync Separator as described in the May 1990 issue. Until now I have used a 9in green screen monitor with my BBC B and latterly a Master 128. It was adequate, but of course I missed the colour capabilities of the machines.

Two weeks ago I saw a second-hand 13in EGA monitor for sale at £10. Remembering your article I bought it. I found the Sync Separator relatively easy to build after following your directions.

When I use the monitor with the BBC B it works fine, the text is sharp and clear with the interlacing on or off and the colours are good. With the Master the colour is good too, however, the interlacing on the text appears unfocused.

When the interlacing is turned off the test is sharp. Of course when using Mode 7, which is designed to be used with the interlacing on, the text always looks blurred.

I have examined the text on the monitor closely and found that on the BBC B it is solid with the interlacing on or off. On the Master with the interlacing off I can see that the characters are made up of varying lengths of horizontal lines with gaps of background colour between them.

With the interlacing turned on the number of horizontal lines appears to double. They are not as bright as previous but can be seen as separate. This is what gives the unfocused effect.

I do not believe that the problem lies with the monitor and Sync Separator as they seem to work well with the BBC B. Is this effect connected with the Master series in general or just my machines? Having only used the 9in monitor before, any blurring would be difficult to detect.

Paul Norwood, Watford, Herts

A *You do have a problem, but it is not the one you think. You see an EGA monitor runs at a different line sync speed to the standard TV-type and so should not work at all. What seems to be happening with your Master is that it is synchronising to one line and then free running the next.*

The question really is: Why does it run correctly on the Model B? It could be that your monitor is able to stretch down and synchronise with it. The Master, although nominally the same speed, must be running just a bit slower and your monitor finally gives up.

You could try adjusting the line base oscillator inside your monitor. If you are at all unsure about this, get a service engineer to have a look as there are high voltages floating about inside there.

VIDC+ screens

Q MY FRIEND was writing a demo on his A3000 and in the process designed some screen modes using VIDC+. It worked fine on his computer with a standard monitor, but when I tried it I got a black and white picture which was constantly flickering, with a coloured stripe at the top.

I tried the program on another Colour TV through the RF socket and a similar thing happened. I decided to try it out on a black and white TV and the flickering stopped, but obviously there was no colour.

I have come to the conclusion that the problem is with the user-designed screen modes as the standard ones are fine. My copy of James Pond 2 does the same thing when the screen scrolls horizontally. Is there a fault with every TV modulator or is it just my computer?

Stephen Potts, Offerton, Stockport

A *When you modulate a colour TV signal on to RF the colour signal is PAL encoded. A full PAL encoder is quite a complex device and can cost as much as the computer itself, so computer manufacturers go to great length to cut down on the circuitry. Acorn have made an excellent job with the modulator in the A3010, especially when you consider that it has to cope with a 4-bit colour system – showing 4,096 different colours.*

So I am not surprised in the least that a custom screen mode defeats the PAL encoder. Most custom modes squeeze extra resolution at the expense of the blank parts of the video signal. This is not important on a monitor but on a TV signal this is where the colour burst signal is. If there is insufficient time for the TV to lock on to this signal you'll get a black and white display.

Smart demo

Q WE recently bought an Acorn A3010 with a Learning Curve pack. There was a smArt demo disk included which proved to be very popular. However, we are now having problems with the disk as we are unable to get the icon down on to the iconbar – double-clicking it just produces the error *file not found*.

We have also tried dragging the icon down on to the iconbar but it will go anywhere but there. Double-clicking on any other icon in the directory display brings up the message *no run action specified for this file type*.

Could you please let us know what, if anything, can be done to rectify this?

G Jones, Amlwch, Gwynedd

A *When an icon appears on the iconbar it is because that program is running and has told the computer to place its icon there. What is happening is that when you double-click the icon, it sets off a chain of events which involves loading and running a series of files.*

These files are stored on the disk inside *the icon you double-click. In this respect it is just like a folder. To open up an icon you double-click while holding down the Shift key. It will then not run but opens up to show the files inside.*

What is happening is that the computer is having trouble accessing one of these files, either because it hasn't been told correctly where to find it or it has become damaged. If it is damaged there is not much hope of doing much with it and your best bet is to contact the people who produce smArt, 4Mation.

*However, it could just be that you have changed the configure options on your computer and the program can't cope. You could try pressing the F12 key and then type *ADFS then press Return twice and try again – although this is a bit of a long shot.*

As a rule you should always try to make a backup copy of any disk you are especially fond of. See your User Guide for information on how to do that.

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EPSON

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LX850+	134	LX1050	176
FX870	229	FX1170	292
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LQ570+	195	LQ870	353
LQ860 Colour	439	LQ1060 Colour	559
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PANASONIC

KX-P1170	93	KX-P2180 Mono	126
KX-P2180 Colour	148	KX-P2123 Mono	135
KX-P2123 Colour	159	KX-P1123	118
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Give me more

I HAVE an A5000 with 4Mb of ram and an IDE 40Mb hard drive. I want to increase my hard disk capacity and would appreciate your advice on the best way of doing this.

I don't want to replace the existing hard drive if at all possible, and would rather extend or add another external drive; not necessarily the cheapest method. I understand that this could be done by either IDE or SCSI.

L.B.W. Bates, Solihull, West Midlands

The space where the second floppy drive should go will quite happily take a second IDE drive – that's where my 100Mb second hard disk is. It's not a kosher upgrade, but given the connectors you can do it yourself. Contact any of the various hard drive suppliers for details and prices.

Printing in Dos

I AM an engineering student at the University of Northumbria and my extremely generous grant will not permit me to buy a laser quality printer – my last student loan paid for my A3000.

The university have a vast array of PCs and high quality printers, and, while I can transfer AutoSketch files to and from its big brother AutoCad, I cannot export my Impression Style files for printing on the university lasers – I do have software to transfer graphics however.

The rigmarole I currently engage in is stripping files to pure ascii and then loading them into Word for Windows and reformatting – all a bit pointless, I might as well use Edit to write the text in the first place.

What I would like to know is if I am missing something somewhere – I know Style can read Rich Text Format (RTF) files – or if there is a utility available to transfer Acorn word processor files to MSdos formats.

Mark Rimmer, Heaton, Newcastle Upon Tyne

To our knowledge there is no product that will convert any Impression document to a Dos or Mac format (even via RTF) – that means there's an opportunity out there for someone (hint hint). Icon Technology are planning to incorporate RTF exporting into their word processors at some point.

Beginners help

AT Christmas I upgraded my BBC Micro to a 2Mb A3010 and have got to know it quite well. I recently bought some PD which included a thesaurus and a game which was as good as a commercial one. It really made me wish I could produce something like that.

I would like to know more about programming so could you tell me what book, as a *beginner*, would help me learn more about how to program. Should I go for the Programmer's Reference Manual or would this be too advanced as I do not know anything about programming.

I am saving up to buy a hard drive. Could you advise me how many megabytes would be suitable as the computer is used for personal family use, school work and a certain amount of games and do I need anything extra to install a hard drive.

I have heard that the RISC operating system is about to be used on PCs. Is this true and if so would it have a bad effect on the Acorn market?

Adam Benli, Hurst Green, East Sussex

Let's clear up the confusions first. RISC (Reduced Instruction Set Computer) is a set of concepts on which several actual processors are based. The ARM, designed by Acorn themselves, is the most successful of the RISC processors and has been available in a commercial computer since 1987.

However RISC OS is the software that drives Acorn's ARM-based computers. Apple and IBM have collaborated to produce computers that use the PowerPC RISC chips: The PowerMac from Apple runs their System 7 operating system while IBM's PowerPC will run a version of Dos.

Microsoft, on the other hand, are soon to release a version of their Windows operating system for ordinary PCs which copies many of the concepts of RISC OS. This is probably what you've heard about.

What effect does it have on Acorn? Not much, the PowerMac is more expensive than the Risc PC from Acorn and runs slower because the increased power of the machine still has to fight its way through System 7. The PowerPC will be even slower and you'll have to use Dos and Windows, yuck.

The education market will be unaffected by anything the PC or Mac markets can invent, simply because the best education software is produced by Acorn-based companies.

Contrariwise: The power of the Risc PC, coupled with the ease of use of RISC OS, will make a big impact on the professional graphics world previously the preserve of Apple, on the music scene (Atari) and on video (primarily the PC strangely enough), which will turn Acorn into a valid computer manufacturer.

Hard drives should be at least 40Mb as an absolute minimum. 80Mb would be better and yes you will need an interface, but these will be sold with the hard disk. If you're likely to want to expand the machine with further add-

Want to write to us? The address is: Letters, Acorn Computing, Europa House, Adlington Park, Macclesfield SK10 4NP.

Under treatment

YOUR Comment column is always interesting, sometimes informative and often thought provoking. In the March issue you wrote on software piracy and I wouldn't want to disagree. I don't like people pinching my effort and I don't have any *copies* of programs on my system. However, I do feel one software provider is not being very fair.

At Acorn World in October I bought a copy of Morpheus and almost immediately sold my computer and bought a new one. I wiped everything from the old machine when we parted company and set it up with factory settings. My old data was copied via floppy to the new machine.

I wasn't very pleased, therefore, to find that Morpheus refused to run or reinstall on the new machine. Buying software for my own use is fine but buying it for one machine which might breakdown or otherwise become useless is another.

Mr Knight, Belvedere, Kent

Steve Turnbull replies: Thanks for your compliment – I don't mind if people don't agree with me but to be ignored would be terrible. Your point about the software is totally valid and this is the reason why I prefer the install/un-install option.

ons you should go for a SCSI system.

Programming is easy on Acorn machines and to get you started you can use First steps in programming on the Acorn Archimedes *by Martyn Fox, published by Sigma Press and distributed by Wiley.*

Once you've got the hang of that you can go on to programming the Wimp with Basic Wimp programming on the Archimedes *which is from Dabs Press.*

Joining the computer village

I HAVE recently installed a rom/ram extension to a BBC B. The board is made by Computer Village and is well past its production date.

Does anyone have any user information or software for this board so that I can make the best of it?

Malcolm Cadman, Deptford, London

If anyone can help Malcolm contact us and we'll pass the information on.

Where's the Electron?

I'VE just woken up from a ten year nap, what's happened to the Electron?

Seriously, I am interested in hardware, software, upgrades and add-ons for an Electron Plus 1 and 64k Master ram board. In particular a joystick that works with the Plus 1. Can you help?

A. Davies, Irlam, Manchester

Let's see, where do we start? Production of the Electron was discontinued just after you fell asleep, the last of 8-bit machines, the Master, was discontinued last year. Acorn's 32-bit machines have been in existence for seven years. However, we're pretty generous, so if anyone with answers or help wants to contact Mr. Davies we'll pass the information on.

Derbyshire users

I AM trying to start some sort of Archimedes User Group in Derbyshire which will probably be called the Derby Acorn user group. However, I need to know if there is anyone who would be willing to help me in running it, as well as possible places to actually hold the meetings for the group.

If the group started I hope to have monthly meetings, a group PD disk and newsletter.

Tim Wiser, Lea Bridge, Derbyshire

If anyone is interested you can contact Tim on 0629 534537.

Days and dates

WHILE drawing a table using Fireworkz, I wanted to enter data which was 147 days from a specified starting date. I had to resort to adding the days on a piece of paper and then entering the answer in the appropriate cell.

I know the nice solution would be a routine written into the software but I cannot see that being available. The next thought was to enter some kind of equation to work out the new data, but after considering ways of determining leap years and then ways of sorting which months the new data would come in, I decided it was too complicated to do the working for live updating of a cell.

I then thought perhaps someone might already have done this in a separate PD-ware program or in a diary-type package? For your information this 147 days is the gestation period after the ewes have been served by the ram!

Ralph Jepson, Elton, Peterborough

Answers on a post card please.

SUFFOLK EWES –Lambing schedule 1993/94

Marking on back	Date Radied	Lambing Date (gestation =147days)	order	Actual Lambing Date
I	22.08.93			
	06.09.93	01.02.94	8	
II	16.08.93	10.01.94	4	
III	19.08.93	13.01.94	5	
14	05.08.93	31.12.93	2	
17	31.07.93	25.12.93	1	
23	31.07.93	25.12.93		
	08.08.93	02.01.94	3	
24	31.07.93	25.12.93		
	19.08.93	13.01.94	6	
31	19.08.93	13.01.94		
	02.09.93	27.01.94	7	
44	10.08.93	04.01.94		
	07.09.93	02.02.94	9	

Sound comments

I THANK you for the review of Sound Advice in the January issue of *Acorn Computing*. I feel that the review was very fair and I am grateful for any constructive criticism that can allow me to improve the package.

However, I am slightly confused about one comment which claims that the grid lines in the pattern editor always think in 4/4 time. This is not the case and they should show any time which is chosen.

Near the end of the review the lack of MIDI file support is mentioned. I am pleased to say that this has now been rectified and the Converter application can now convert to and from MIDI formats 0 and 1.

This is available as a free upgrade to all registered users providing they return the original disk.

Richard Windley, The Really Small Software Company, Battle

Further to the review of ImpactPro in the February issue the program has now been considerably updated and I wonder if you could find space to make a few points:

- Sprites can be loaded directly from a sprite file
- I feel the reviewer was being a little unfair on the matter of database corruption. If disaster strikes and your machine crashed you are likely to loose data from almost any application
- A database like ImpactPro has special problems as data must be accessed directly from the disk. To hold all data in ram would severely limit the size of the database and professional databases are not written that way.

  If the data file was opened and closed every time it was accessed, most operations would run about 10 times slower. ImpactPro is a relational database, so closing a record does not imply that the file has been finished with as it may be referenced from another card which is still displayed
- To help guard against data loss, the current version of the program features an *auto save function* whereby all unsaved file data is flushed to disk, either at regular intervals with Impression or after a given elapsed time with no file access.

  This may be set by the user who may also be optionally prompted before a save takes place. Closing down the computer correctly will naturally cause ImpactPro to close all open files. Any serious user would also make regular backups of important data

As far as ImpactPro not living up to its Pro tag, I would like to point out that we use it professionally to maintain our customer database, details of all orders, invoice production, program registrations, stock records and so on.

As we are constantly updating and improving the program on an almost daily basis, may I advise prospective customers to call for the latest details and a free demo disk and existing owners to return their original disks for a free upgrade by return of post.

John Skingley, Circle Software, Purton

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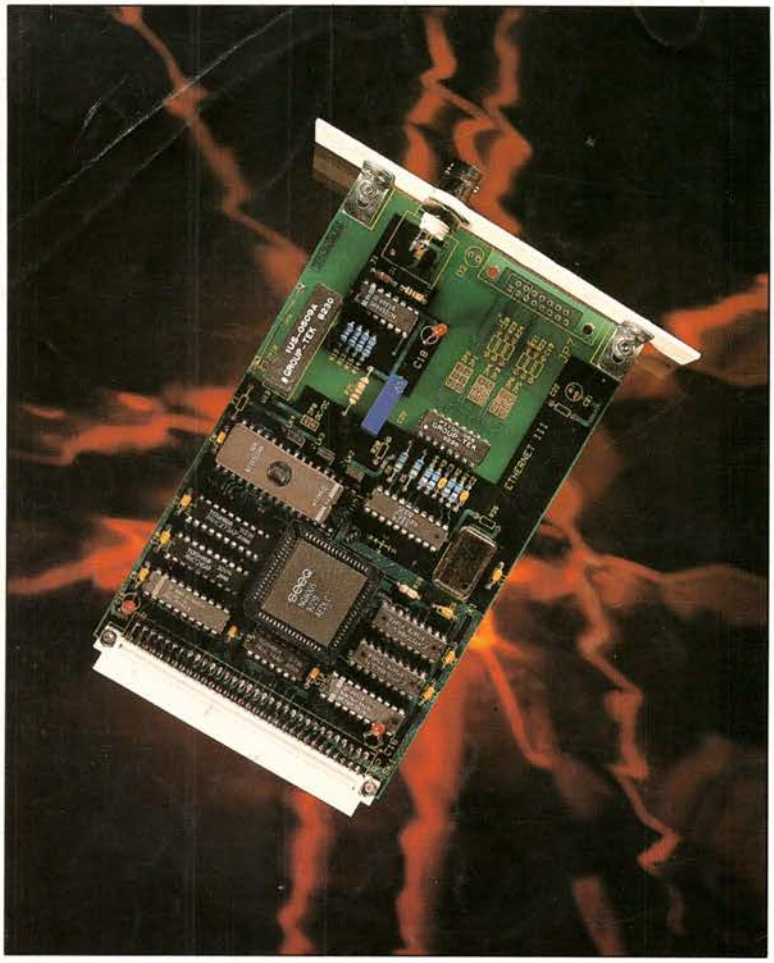

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